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ORIGINAL ARTICLES

RELATION OF THE ORBITAL PLANE TO POSITION OF TEETH*

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From Catholic University

A RECENT attempt has been made by Dr. Paul Simon,† of Berlin, to diagnose abnormalities in teeth and jaws, on the basis of the relation existing between the position of the teeth and the orbital plane. By the orbital plane is understood that plane passing through the lower orbital points and at right angles to the ear-eye plane or Frankfort Horizontal and to the median sagittal plane. Doctor Simon examined several hundred cases with correct occlusion and found that the orbital plane passes through the cusps of the maxillary canines and the distal edge of the mandibular canines. He therefore concludes that the teeth in such cases are normally placed. If, however, the orbital plane passes in front of the canines, these stand too far back, and with them the molars and premolars. He claims this relation to exist even during the growth period of five to eighteen years.

While it is quite probable that such a relation may have been found to hold in a large number of cases, yet the great variability in the development of the bones of the face, even within the same race, leads one to suspect that such a criterion of the normal position of the teeth would be dangerous to apply in correcting a supposedly malposition. And it would seem especially hazardous to apply to the white race, where great variability is so pronounced a characteristic.

It is still possible, however, that the ear-eye plane might occupy a fixed position with respect to other parts concerned, so that Simon's so-called "Law of canines" might hold good. It is well known that the orbits vary considerably in individuals, yet the orbital points, through which the ear-eye plane or Frankfort Horizontal passes, might bear a fixed relation to other facial parts.

*Reprinted from American Journal of Physical Anthropology, January-March, 1927, x, 71.

†Simon, Paul W.: On Gnathostatic Diagnosis of Orthodontia, Inter. Jour. Orthodontia, x, 755-797.

In order to test this, I undertook, at the suggestion of Doctor Hrdlicka, the examination of the crania of whites in the collection of the Division of Physical Anthropology, U. S. National Museum, and made measurements of the orbital regions as indicated in Fig. 1. The perpendicular distances from the line connecting the frontomalare orbitale of each side to the lower and upper orbital points were taken in order to determine the immediate factor causing the variation in each particular case. In taking these measurements, several methods were tried, but the simplest proved the most convenient as well as the most reliable. A close-fitting rubber band was placed over the skull parallel to the Frankfort Horizontal and passing through the frontomalare orbitale of each side, that is through the points where the frontomalar suture meets the orbital border. The perpendicular distances of the lower and upper orbital points were then taken with sliding calipers. The orbital height and breadth (from dacryon) were also taken for purposes of comparison and to indicate more readily the variability or the orbits by the index.

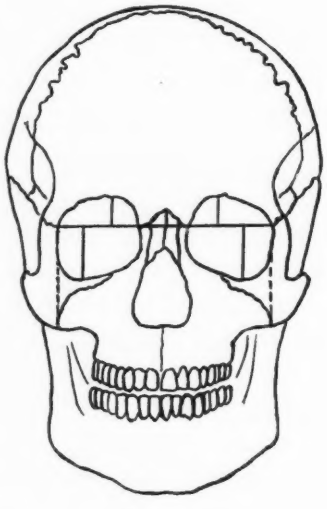


Fig. 1.

As there is a correlation between form of orbits and length of face, the fact suggested another measurement, namely, the distance from frontomalare to zygomaxillare, that is, the lowest point of the suture between the maxillary and malar bones. Table I gives these measurements as found on fifty white males. The orbital height, breadth, and orbital index are given in the first three columns, respectively, and the other measurements, already mentioned, in the next three columns. All measurements are given in millimeters.

The great variability of the orbital index is obvious from these examples, and it may readily be seen from the table that there is no proportional increase in the distances above and below the plane of the frontomalare and the height of the orbits. In No. 1 the distance below the plane is relatively quite small, while that above the plane is above the average. In No. 2 we have about the average condition. In No. 3 there is a great increase in the distance below the frontomalare level (27 mm.), while the distance above is exactly the same as in No. 4 (11 mm.), where the distance below the level is only 24 mm. The lower

orbital points are, therefore, relatively much lower than in the other skulls, due to the lengthening of the frontal processes of malar and maxillary bones. This is indicated by the unusual distance from frontomaxillare to zygomaxillare, namely, 55.5 mm. In No. 25 similar conditions are present, though here the distance from frontomalare to zygomaxillare is only 45 mm., due to the smaller width of the malar bone. In No. 40 we have a very different condition. While

TABLE I

MALES

NO.	ORBITAL HEIGHT. MEAN	ORBITAL BREADTH. MEAN	ORBITAL INDEX. MEAN	FRONTOMALARE ORBITALE TO LOWER ORBITAL POINT. MEAN	FRONTOMALARE ORBITALE TO UPPER ORBITAL POINT. MEAN	FRONTOMALARE ORBITALE TO ZYGOMAXILLARE. MEAN
1	30.0	38.0	78.9	19.5	12.0	40.5
2	30.5	39.5	77.2	22.5	9.0	44.5
3	36.0	40.0	90.0	27.0	11.0	55.5
4	34.5	37.5	92.0	24.0	11.0	48.5
5	31.5	37.0	85.1	23.5	10.5	44.0
6	30.0	35.0	85.7	20.5	10.0	49.5
7	33.5	39.5	84.8	23.5	11.0	48.0
8	34.5	35.5	97.1	23.0	12.5	42.0
9	32.0	37.5	85.3	23.5	12.5	42.5
10	31.5	38.5	81.8	22.5	9.5	42.5
11	30.5	37.5	81.3	20.5	10.0	42.0
12	33.5	37.5	89.3	24.0	9.5	44.0
13	36.5	38.0	96.0	25.5	13.0	46.5
14	34.0	38.0	89.5	23.5	11.5	45.5
15	32.5	40.0	81.2	23.5	11.5	43.5
16	33.0	40.0	82.5	23.0	11.5	41.5
17	32.0	37.5	85.3	21.5	12.0	44.5
18	30.5	40.0	76.2	21.5	10.5	40.0
19	32.0	39.5	81.0	22.5	11.0	42.0
20	34.0	41.0	82.9	23.0	12.5	48.0
21	36.5	40.0	91.2	26.5	11.5	44.0
22	33.0	37.5	88.0	23.0	11.5	45.0
23	33.5	38.0	88.1	23.0	10.5	42.0
24	29.5	34.5	85.5	21.0	9.5	41.5
25	36.0	36.5	98.6	26.5	10.0	45.0
26	32.5	39.0	83.3	23.5	9.5	43.0
27	30.5	38.5	79.2	22.0	9.0	42.0
28	35.0	41.0	85.4	24.0	13.0	46.0
29	33.0	38.0	86.8	23.5	9.0	44.0
30	31.5	37.5	84.0	23.0	10.5	43.0
31	33.0	39.5	83.5	24.5	11.5	43.0
32	30.5	35.5	85.9	21.0	9.5	42.5
33	32.5	39.0	83.3	23.5	11.0	45.0
34	34.0	36.0	94.4	22.5	10.5	40.5
35	31.0	37.5	82.7	22.5	10.5	43.5
36	30.0	38.5	77.9	23.5	9.5	42.5
37	31.0	40.0	77.5	21.5	12.0	45.0
38	30.5	39.0	78.2	21.0	11.5	43.0
39	34.5	39.5	87.3	26.0	10.0	46.0
40	27.0	35.0	77.1	17.5	11.0	42.0
41	32.0	40.0	80.0	22.0	12.0	43.5
42	30.0	38.5	77.9	20.5	10.5	42.0
43	29.0	39.0	74.3	20.5	10.5	41.5
44	31.0	38.5	80.5	22.0	10.0	43.5
45	29.5	37.5	78.7	22.0	10.0	44.0
46	31.0	37.0	83.8	21.0	11.0	41.5
47	31.0	40.0	77.5	21.5	11.5	41.5
48	34.5	38.0	90.8	23.5	12.0	43.5
49	29.5	36.0	81.9	20.5	10.0	41.0
50	31.5	37.0	85.1	22.5	10.5	41.5
Average,	32.1	38.1	84.3	22.7	10.8	43.7

the distance above the level is the same as in No. 3, the distance below is only 17.5 mm., though the skull was of good size. Its orbital index is only 77.1.

In Table II we have results of similar measurements made on female skulls. In skulls Nos. 2 and 3 we have same distance from level of frontomalare to upper orbital points, but in No. 2 the distance of lower orbital points from that level is much greater (namely, 28.5 mm.) than in No. 3, showing that here again it is the lengths of frontal processes of malar and maxillary bones that account for low position of the orbital points. The distance from frontomalare to zygomaxillare is correspondingly great (44.5 mm.). In No. 5, however, the distance above the level of frontomalare is greater than in the preceding skull (13.5

TABLE II

FEMALES

NO.	ORBITAL HEIGHT. MEAN	ORBITAL BREADTH. MEAN	ORBITAL INDEX. MEAN	FRONTOMALARE ORBITALE TO LOWER ORBITAL POINT. MEAN	FRONTOMALARE ORBITALE TO UPPER ORBITAL POINT. MEAN	FRONTOMALARE ORBITALE TO ZYGOMAXILLARE. MEAN
1	34.5	35.5	97.2	21.5	9.5	40.0
2	38.0	38.5	98.7	28.5	11.5	44.5
3	34.0	37.5	90.7	23.0	11.5	41.0
4	32.0	37.5	85.3	23.5	9.5	41.5
5	34.0	35.5	95.8	22.5	13.5	39.5
6	28.5	34.5	82.6	21.5	9.5	40.0
7	35.0	36.5	95.9	21.0	15.0	41.0
8	28.5	33.5	85.0	21.0	9.5	41.5
9	37.0	39.0	94.9	25.0	12.5	41.5
10	34.5	38.0	90.8	23.5	12.0	40.0
11	30.0	35.0	85.7	21.5	10.0	41.5
12	31.0	35.0	88.6	20.0	11.5	40.5
13	31.5	36.0	87.5	23.0	9.0	40.0
14	33.5	36.5	91.8	24.0	11.0	43.0
15	31.5	37.5	84.0	22.0	10.0	44.5
16	30.5	35.5	85.9	22.0	10.0	41.0
17	30.0	36.5	82.2	22.0	10.0	40.5
18	33.5	37.0	90.5	25.0	10.0	41.0
19	30.5	36.0	87.5	20.5	12.0	37.0
20	30.5	39.5	79.7	22.0	12.0	40.5
21	34.0	35.0	97.1	22.0	13.0	40.0
22	35.0	37.5	93.3	24.5	12.0	43.5
23	32.0	38.5	83.1	23.5	10.0	41.0
24	33.0	35.5	92.9	24.0	11.0	42.5
25	32.0	39.0	82.0	25.0	9.5	42.0
26	34.5	37.5	92.0	22.0	13.5	44.0
27	34.5	38.0	90.8	23.5	12.0	43.0
28	33.5	38.0	88.0	23.0	12.5	49.0
29	34.0	40.5	83.9	23.5	12.5	40.5
30	37.0	39.5	93.7	28.0	10.0	44.5
31	33.5	42.0	79.8	25.0	12.5	44.5
32	30.5	35.5	85.9	21.0	11.5	37.0
33	32.5	37.5	86.7	23.5	10.5	43.5
34	33.5	37.5	89.3	23.5	11.0	41.0
35	31.0	34.5	89.8	21.5	10.0	38.0
36	33.0	35.0	94.3	22.5	12.0	40.5
37	34.5	37.0	93.2	24.0	12.0	45.0
38	32.5	37.5	86.7	23.5	10.0	44.5
39	38.0	38.5	98.7	26.0	15.0	43.5
40	35.0	40.0	87.5	24.5	14.5	41.0
41	34.5	40.0	86.2	25.5	12.0	41.0
42	32.0	35.5	90.1	23.5	11.0	42.5
43	38.5	39.5	97.5	27.5	12.0	41.0
Average,	33.1	37.1	89.3	23.3	11.4	41.6

mm.), the angular process of frontal bones being longer than in other skulls, with a corresponding short distance from frontomalare to zygomaxillare (39.5 mm.). In No. 7 the distance of upper orbital points is still greater (15 mm.), due to same factor.

If we compare skulls Nos. 8 and 9, we see quite different conditions from any previously mentioned. In No. 9 the distance of orbital points both above and below the frontomalare level is greater than in No. 8, though the distance from frontomalare to zygomaxillare is identical in both cases (41.5 mm.). This shows that the increase in distance of lower orbital points is at expense of zygomaticomaxillary process—a condition frequently met in female skulls where the malar bone is usually smaller than in the males.

We have noted only a few examples to illustrate the variety of conditions present, but the reader may see from the above tables that the orbital points do not occupy a definite position with respect to other structures. In Table III is given the means of the various measurements on fifty male and forty-three female skulls with the standard deviations (S. D.) and the standard error, and also the coefficient of variation (V.) with its standard error. We may note, first

TABLE III

SUMMARY

NUMBER		ORBITAL HEIGHT	ORBITAL BREADTH	ORBITAL INDEX	FRONTOMALARE TO LOWER ORBITAL POINT	FRONTOMALARE TO UPPER ORBITAL POINT	FRONTOMALARE TO ZYGOMAXILLARE
				MALES			
50	Mean	32.1	38.1	84.3	22.7	10.8	43.7
	S. D.	2.08 ± 0.20	1.57 ± 0.15	5.6 ± 0.56	1.8 ± 0.18	1.05 ± 0.10	2.69 ± 0.26
	V.	6.48 ± 0.65	4.12 ± 0.41	6.6 ± 0.66	8.02 ± 0.80	9.65 ± 0.96	6.15 ± 0.61
				FEMALES			
43	Mean	33.1	37.1	89.3	23.3	11.4	41.6
	S. D.	2.43 ± 0.26	1.9 ± 0.20	5.1 ± 0.55	1.9 ± 0.20	1.51 ± 0.16	2.17 ± 0.23
	V.	7.36 ± 0.80	5.12 ± 0.55	5.7 ± 0.62	8.11 ± 0.87	13.27 ± 1.44	5.23 ± 0.56

of all, that the figures for the orbital length, breadth, and the index for these skulls are quite typical for whites. The orbital height is greater absolutely as well as relatively in females than in males, while the breadth is greater, on the average, in males. The orbital index in females is therefore higher than in males. The standard deviation of the index is very high, namely, 5.6 ± 0.56—a feature which is also typical for these structures. The distances of the upper and lower orbital points from the level of frontomalare likewise show great variation, not in any way correlated with the size or form of the orbits. There is obviously a great variation in the dimensions of the facial units, and it is evident from the examples pointed out that Simon's norm could not successfully be applied in these cases. Our series is sufficiently large to illustrate typical conditions in the white race. The crania are representative of the principal European white races and indicate the normal variation. A glance at the tables shows clearly that the lower orbital points have not a definite position with respect to other facial parts. Hence, when the lower orbital points are placed relatively

low, due to factors we have seen, the orbital plane would pass behind the canines; when placed relatively high, the orbital plane would pass in front of the canines; and in both cases the teeth might be perfectly normal in position.

We must note, further, that the lower orbital points would not always be under the pupils in the living, as Simon implies, for the orbits of males often slope obliquely downward and outward. This in itself would not change the position of the orbital plane. But another kind of variation would influence its position, especially when linked with the preceding. This is the angle of the orbits to the Frankfort Horizontal. Frequently, the orbital height is at right angles to the Frankfort Horizontal, but it may be inclined downward and backward, thus bringing the orbital plane farther back.

In conclusion, we may refer to the application of the "law of canines" to adolescent years. If the principle cannot be applied in many cases to adults, this would seem a fortiori to be the case in regard to youthful persons. The face does not assume its definite form until the teeth of the second dentition have erupted. In the process of growth, it is especially the face compared to the cranium that undergoes rapid changes. We have not made measurements on skulls of early age, but it may legitimately be inferred that the principle would have even less applicability than in the case of adults.

THE NECESSITY OF AN INDIVIDUAL THERAPY INSTEAD OF SCHEMATIZING METHODS*

By Dr. Albert Kadner, Hamburg, Germany

THOSE methods of treatment which aim at comparatively perfect efficiency of the chewing apparatus combined with an esthetic effect of the face, have become so familiar to the dentists, that questions as to their scientific justification hardly interfere with their application. Yet the future development of our art depends on its permeation with a scientific way of thinking.

Now most of our scientific methods in orthodontia show a special liking for schematizing treatments, whereas other possibilities, i.e., etiology, are deplorably neglected.

I shall try now to explain how misleading schematizing methods can be and even must be. I beg to appeal to all of you to join in studying the secrets of etiology, the progressive revelation of which will help to give our art the necessary scientific foundation.

Exampla docent! So I will first of all give you a striking example which clearly illuminates the difference between modern schematizing and those good old well-known rules of functional individual treatment.

The case is a young girl whose individual type became so much altered by a schematizing treatment, that her parents disliked the resulting strange and unfamiliar appearance of her face. They say, that the lower part of the face has become so broad and retruded, that the family type is altogether lost. A colleague of mine who carried through the treatment, consulted with me about the result. He had based the treatment upon measures made out after Pont. Pictures of the models may be seen in Figs. 1 and 2. In the first picture you see the case before treatment, (a) in the middle after treatment by my colleague according to Pont's idea, (b) on the right, (c) how things would have been after a strictly individual treatment. The measurements are: The distances of the first premolars were 33 mm., of the first molars 44.5 mm. They had become after Pont's index 40 mm. and 50 mm. respectively. After individual treatment they would have been respectively 36 mm. and 45.5 mm. That is to say: The arch of the jaw was augmented about half a centimeter in breadth, the frontal teeth were pressed backward, consequently the expression of the face underwent a considerable alteration. And, mind you, very often the stretching goes as far as a whole centimeter and even more! A strictly individual treatment would have resulted in certainly no less functional improvements and in a preservation of the individual and the family type as well.

Now, what are the principal mistakes of schematizing treatments? You all know that Pont, in analogy with the skull-index of the anthropologists.

*Read before the First International Orthodontic Congress, New York City, August 16-20, 1926.

computed indices for the distances of the molars and premolars. Pont gained his indices by a simplification of Hawley's method of arch construction. Instead of taking, as Hawley did, the sum of the diameters of the middle and lateral incisors and the canines, he only takes the sum of the diameters of the incisors, because by Hawley's construction, so Pont says, there would result an interval between the distal end of the canine and the mesial end of the first premolar. Pont takes a rather arbitrary anthropologic skull-formula,

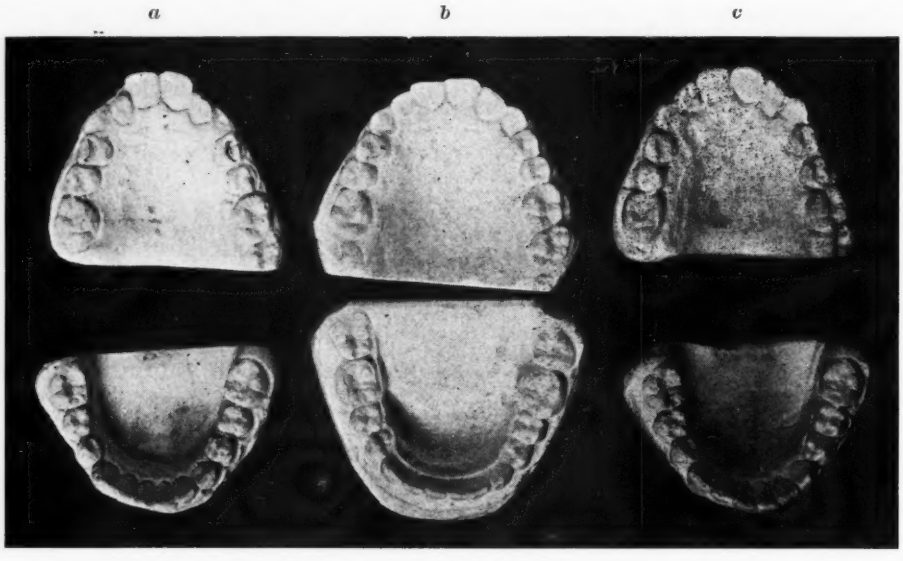


Fig. 1.

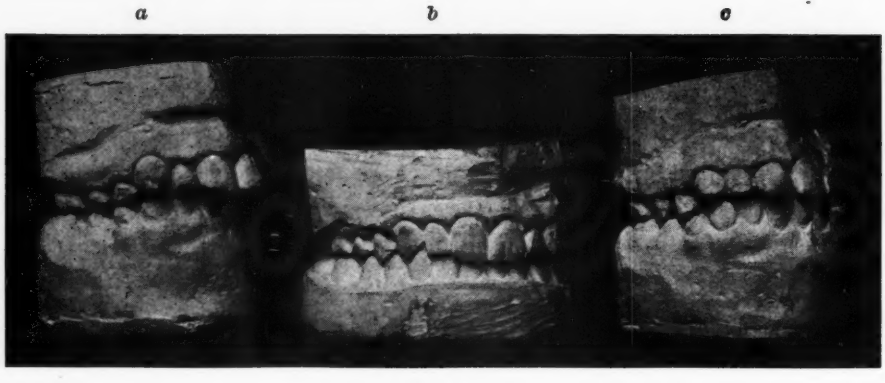


Fig. 2.

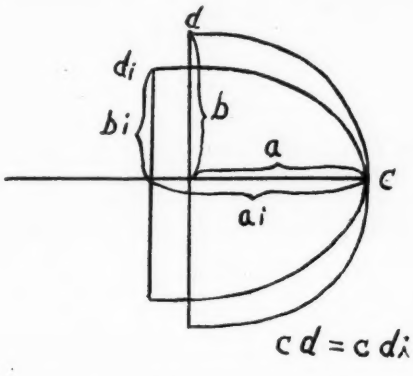
which in its application remains merely theoretic in as far as no anthropologist has the practical intention of deforming human skulls according to those formulae. He substitutes it, in place of the length-diameter of the skull-formula, the sum of the diameters of the upper incisors, which, of course, is totally arbitrary again. But the worst of it is, that this formula does not remain on merely theoretic ground, but serves as a basis for regulating the position of teeth.

All mathematic constructions in reference of the bow-question are futile, they are, to my idea, nothing but a would-be scientific embellishment. From

a purely mathematic point of view, a lesser breadth of arch, together with the same breadth of teeth, can very well correspond with a larger height of the arch, as, i.e., the length of elliptic quadrants can be the same in spite of different proportions of the greater and the smaller axes. And there exists neither a practical nor scientific reason, why the circle should be preferred to the other conic section or even to other curves. In fact, a mathematician would certainly advise to take the parabola. But, of course, he would not think such constructions applicable in this sense at all. (See diagram.)

A practical illustration of this mathematic situation of the question we find in the most excellent researches of Thompson on the typical forms of the bow of several races and individual types. In face of his results it seems to me more than bold to press the diverse individual and racial types into formulae which have been gained in a schematizing and arbitrary way.

Considering the multitude of possibilities for variation in the human races and within the single races those of family-groups, one feels almost compelled to raise the question of how the single individual with his develop-



ment is connected with all those impulses arising from belonging to much narrower and more extensive groups. And thus we stand before the problems of etiology as well as those of inheritance specially. It is easy to understand that between all schematizing methods and such methods as may result from an intricate study of the above-mentioned problems there must be an immense and principal difference. As I cannot here enlarge upon these questions I beg to refer to an essay of mine on the problem of inheritance in which these questions are treated in detail. You will have occasion to see many examples in the exhibition of the Congress.

Figs. 3 and 4 show a case of distal occlusion. The measures of the distances of the first premolar were 30 mm. After Pont's index they must be 39 mm. Those of the first molars were 43 mm. After Pont's index they were 48.4 mm. According to Pont a lateral expansion of 9 mm. at the premolars and 5.4 mm. at the molars would have been necessary. I had to expand the distance of the premolars for 2.5 mm. and those of the molars for 1 mm. The lateral incisors were brought forward only a little bit, and then the premolars and molars were erected. The other schematizing methods would also have resulted in considerable expansion. Naturally the mandibu-

lar jaw also would have to be expanded. The pictures show, however, that I did not affect the mandibular jaw at all.

Figs. 5 and 6 represent distal occlusion also, but in this case it was caused by a retrusion of the upper middle incisors. According to Pont, the lateral parts of the upper jaw ought to be half a centimeter broader. The distance of the first premolar was 34 mm., it would have become according to Pont 39 mm. but really became 35 mm. only. The distances of the first molars

a *b*

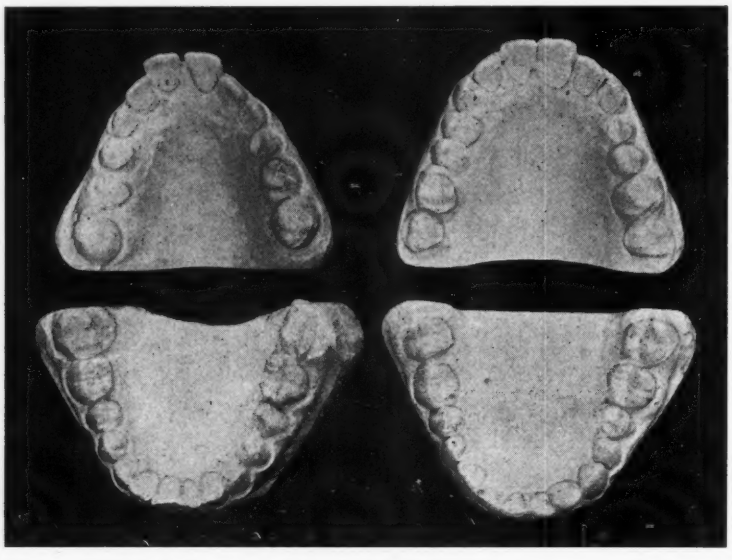


Fig. 3.

Figs. 3-15.—*a*, before treatment. *b*, after the individual treatment.

a *b*

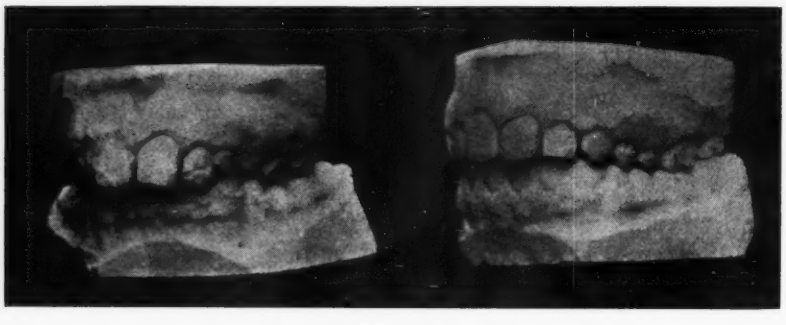


Fig. 4.

were 43 mm., 48.4 mm. and 45 mm. respectively. The middle incisors were broad, forward just a little, and the lateral incisors under torsion brought backward into the now available space. The premolars and molars, which by the distal bite were bent a little to the inside, had only to be erected 1 mm. and 0.5 mm. respectively.

In Figs. 7 and 8 you see the same distal occlusion. Pont's index would have called for an expansion of 5.5 mm. for the premolars and 7.5 mm. for the molars. My treatment did not shift the lateral teeth in the least. Only

a *b*

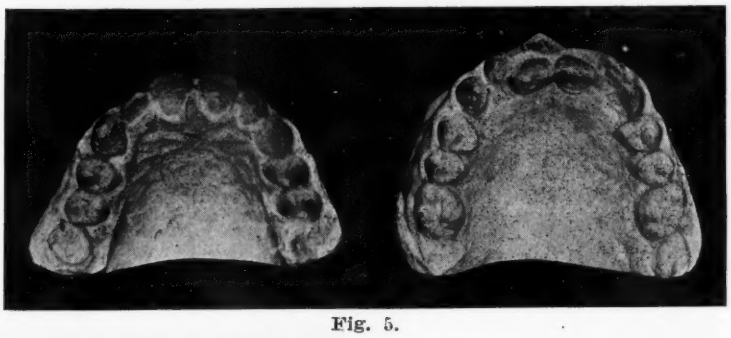


Fig. 5.

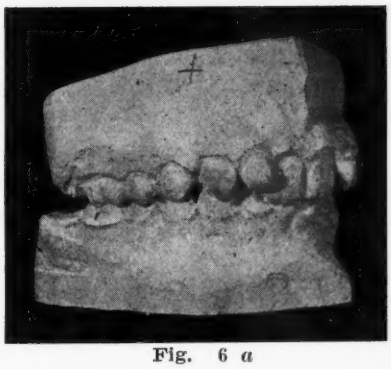


Fig. 6 *a*

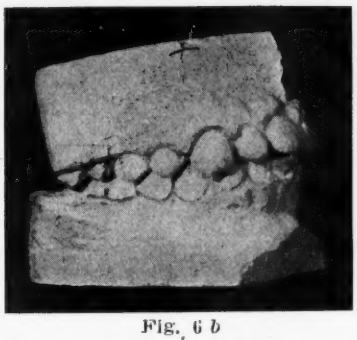


Fig. 6 *b*

a *b*

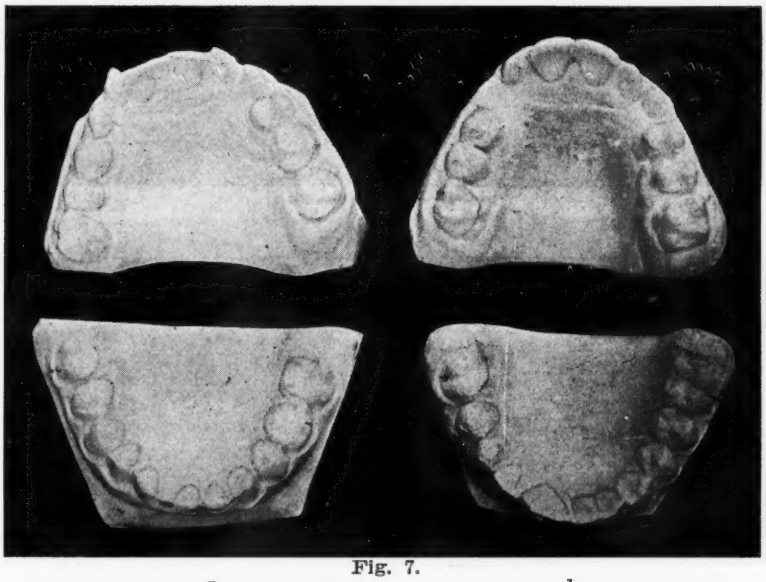


Fig. 7.

a *b*

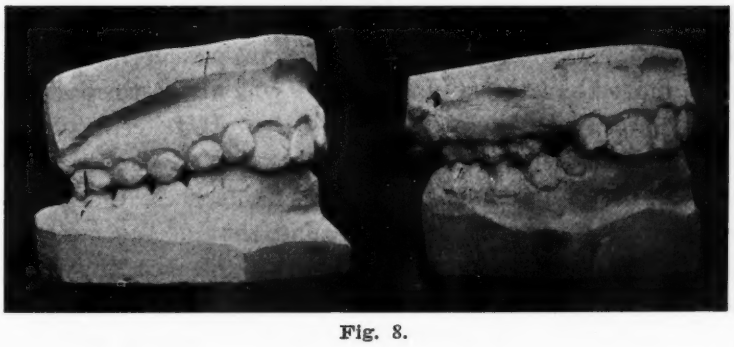


Fig. 8.

the middle incisors of the upper jaw were brought forward a little and the lateral retruded.

Figs. 9 and 10 represent an exceedingly broad jaw. According to Pont the distance of the premolars would be 37.5 mm. and that of the molars 46.87 mm., but in reality it is 42 mm. and 51 mm. respectively. It is the same form of bite as in the other cases, i.e., a distal occlusion, that was caused by too upright a position of the upper incisors. These were brought forward a little and the left lateral incisor was pressed backward. All these cases are examples for a treatment with the eye upon causal therapy.

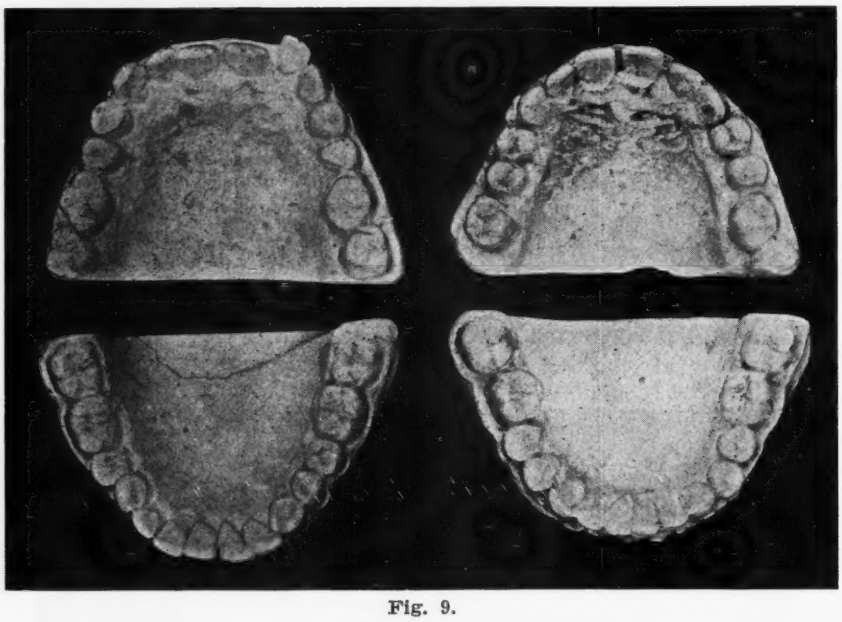


Fig. 9.

Fig. 10.

The next case (Figs. 11 and 12) is very interesting. The patient was a young lady of more than thirty years. She was about to marry and thought it necessary to improve a little on her beauty. If I had treated her with a schematizing method, I believe she would have made me responsible for the deterioration of her appearance. For Pont's index would have expanded the distance of the premolars for 9 mm., and that of the molars for 5.4 mm. I expanded it for 2 mm. with the premolars and 1 mm. with the molars, and the charm of her individual type was preserved.

In Figs. 13 and 14 is seen, how a distal occlusion can come about. One lateral incisor having cut through to the inside, the mandibular jaw is forced to occlude backward. After bringing forward this incisor, the anomaly was cured. If one would treat this case after any schematizing method, a very circumstantial expansion would be necessary with both jaws.

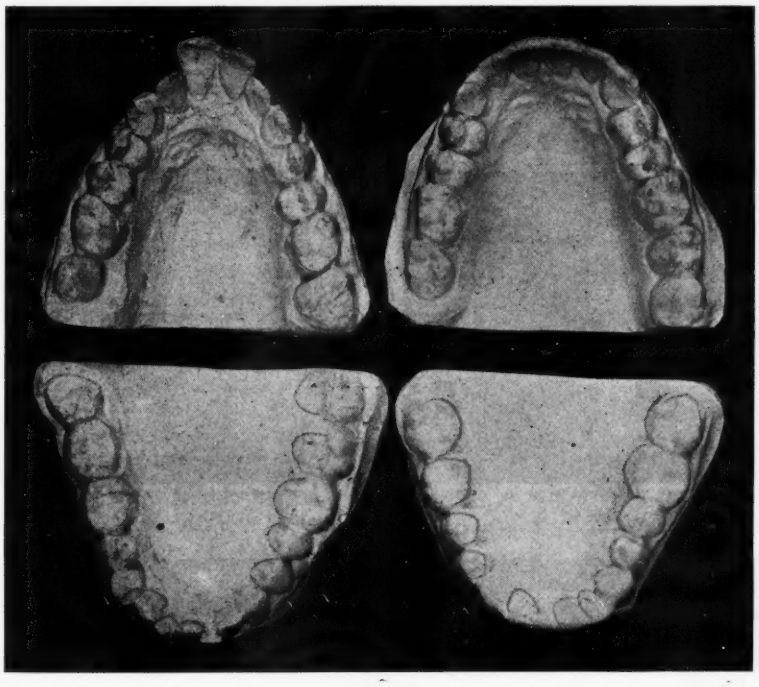


Fig. 11.

Fig. 12.

The situation becomes more fatal still when corrections of mesial occlusion are to be contrived. If one would give the maxillary jaw a lateral expansion in a case as shown in Fig. 15, the mesial bite would by no means be ameliorated. The most logical proceeding is, of course, to bring forward the upper frontal row, thus simply approaching each other both rows of teeth.

I am fully aware of the fact that dentists may have had good experiences with treatments based on schematizing methods, but I am also convinced that there will also be ever so many failures. I feel quite sure that treatments that arise from really scientific methods will prove far superior in

Fig. 13.

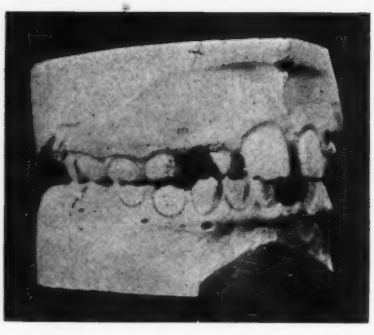


Fig. 14 *a*

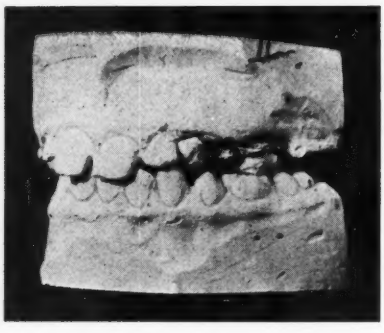


Fig. 14 *b*

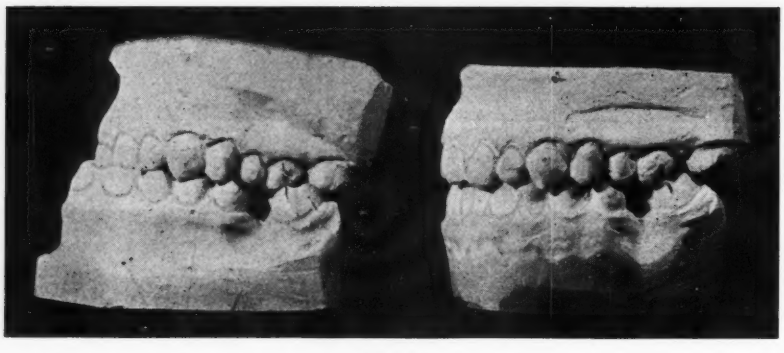


Fig. 15.

practical results to all schematizing. On the other hand there must be said that most orthodontists will right away choose treatments similar to those pointed out in my examples. They will be convinced, that the restitution or the creation of a normal occlusion without much speculation of any sort will be all that can be expected of orthodontic art. The results I gained from my researches into this matter from an etiologic standpoint enable me, I may say, to draw the conclusion, that the ideas of treatment as applied by Dr. Angle from a purely empiric basis, are far superior to all that schematizing methods can bring about, and that he and all those who work from a similar basis are very near to those methods which result from real scientific considerations.

DISCUSSION

Dr. C. A. Hawley.—I desire to discuss this paper briefly, not because I take any issue with the writer in his procedure, but because he, as well as many others, has misunderstood the objects and claims made for my plan of predetermining the dental arch. This

method was described in papers read before the Fourth International Dental Congress in May, 1905, at the New York Institute of Stomatology, and at the American Dental Society of Europe in 1906 over twenty years ago.

Dr. Pont's later method differs from mine: *First,* in taking the widths of the centrals and laterals only, instead of the centrals, laterals and canines, which produces essentially identical results and which was described as forming the basis of my charts in my paper in 1906. The results in either case are only approximations and the difference is not important. *Second,* in measuring from the raphe-median plane in each direction, a method which I think is an improvement, as it determines more accurately unilateral asymmetry. Both methods, however, have the same object; viz: an approximate determination of the normal arch for the given size the teeth.

The essayist assumes that it was recommended that all arches were to be brought exactly and mathematically to these measurements. No such recommendation was ever made. In proof of this statement, I wish to quote from my first paper written in 1905:

"It is not necessary in estimating the value of this method to contend that the full width of the arch indicated must always be obtained or that any hard and fast rules must be followed. Conditions may justify stopping short of full expansion, but in all cases it is valuable to know the exact form of the normal arch, and then such variations from it may be made as the judgment of the operator indicates."

Objections similar to those of the essayist were immediately raised to this method and in my paper one year later I said:

"On the occasion of the presentation of the former paper and since that time, fears have been expressed that, in bringing into orthodontia a mathematically and geometrically calculated plan, we would restrict or eliminate the feature of artistic judgment, and that the method leaves no room for the exercise of the judgment in changing the form of the arch to satisfy the requirements of the various types.

"These fears or objections have been due to a misconception of the elasticity of the method in its application. In this paper, I wish to add something to the clearness of presentation of the method, and, in reply to the above-mentioned objections, will make the proposition that, in so far as hampering, in any way, the use of the judgment in the art requirements in orthodontia, this method lays down the most valuable principles and forms the most important basis upon which artistic results in orthodontia must be accomplished; and instead of restricting the variation of the arch to correspond to different types, it forms the only safe guide for procedure in such variation.

"I did not formerly, nor do I now, wish to be understood as insisting on this form of arch in detail in every case.

"My own argument, at this time, is for its use as a standard, a basis of diagnosis and study and the accurate and systematic planning of the work, estimating beforehand what we wish to to accomplish, and working quickly and accurately to that end. We should not attempt to change the form of any arch without a definite end in view. It will greatly lessen the discomfort to the patient and the time for the operation."

Dr. Kadner quotes Dr. Thompson to show that there are different types of natural arches. In this same paper I said:

"The ideal form of arch is determined with some difficulty and we might admit that there is no ideal arch for all cases. Dr. A. H. Thompson has made extensive observations of the form of arch in different races and gives the following typical forms: Fig. 1, 'The square arch,' he says, 'is found usually in persons of strong osseous organization, of Scotch or Irish descent, i.e., Gaelic extraction.' * * * * 'The rounded square is the medium arch usually found in ordinary, well developed Americans.' * * * 'The rounded arch is quite characteristic in some races, as the brachycephalic South Germans.' * * * 'The rounded V is the arch of beauty and that most admired in women of the Latin races.'"

We rarely or never see in our routine work such distinct types as Dr. Thompson shows. Approximations to them, however, are found and must be dealt with intelligently.

In Dr. Bonwill's study of arches where they had developed into normal occlusion without interference, he found this form and size of arch very closely approximated and Dr. Brady has very well expressed the probable reason why this is true. He says:

"Referring to the Bonwill arch, the facts are, that if nature were not thwarted in her purpose, every dental arch would be upon these perfect lines. The mechanics of the case compel an arch of this form to permit of the highest usefulness and the mechanical forces of mastication produce this arch as nearly as possible. Even in malocclusion, the teeth follow this perfect form just as much as the mechanics of the case admit. The mechanics of the case demand an arch of a certain definite form, because of fixed and unchangeable laws, and not because somebody thinks it ought to be that way or because it makes a pretty diagram on paper. As long as the jaw comprises an equilateral triangle, and rotates upon one condyle at a time, when moving laterally, just so long will this form of arch be the one unvarying end that Nature tries to attain in her way, and be the one final result that we should seek in our work. Until the lower jaw changes its form or its motion, all men will (or should have) arches of the present form, and race, color, temperament or hobby, fad or ism will not change the facts in the least."

It has proved very valuable to know approximately what the normal development of any set of teeth which are in malocclusion would have been, but this fact does not mean that hard and fast mechanical rules should be followed. As has been well expressed by Dr. Simon in his book "Gnathostatic Diagnosis," "the test of any method is not necessarily its mechanical accuracy, but its usefulness." In other words, is it accurate enough to help one to estimate a wise and correct procedure? The fact that these methods of arch determination have stood the test of twenty years and that they are in almost universal use today seems to be the answer to that quesion.

I am very glad that Dr. Kadner has brought up the matter of the use of these methods in his paper and I can easily agree with him that it is not wise to use mechanical methods blindly. I might suggest, however, that it would have been more helpful if he had set forth more specifically the reasons why in these cases he has shown he chose to make these variations. If we could see photographs of the faces of these patients, showing the form of the head and the types, we could more accurately judge the wisdom of his procedure.

Dr. Harry E. Kelsey, Baltimore, Md.—We are indebted to Dr. Kadner, for his excellent presentation of one side of a very important matter. As a copy of his paper, however, did not reach my hands until a few days before this meeting, and as those days were very closely filled with other duties, I have been unable to give it the time and study necessary to prepare a discussion, such as the subject deserves.

In one way, I have a feeling of sympathy for Dr. Kadner's views and have sometimes expressed the opinion, that we should not give up anything we have, until something better can be substituted for it, and I have always felt that the results obtained by conscientious orthodontists, working with such knowledge of technic and etiology as we have at the present time, has been well worth while. I believe the professions and laity agree, that orthodontia has amply justified itself as a specialty, and that the percentage of failures, is far below that of many other branches of medicine. Of course, opinions vary as to what might constitute failure. In the eyes of a fond parent, a slight unevenness in the anterior teeth, is often regarded as a failure; while perfectly even anterior teeth, no matter how functionally imperfect the remainder, may be regarded as a success; but by the profession, a slight relapse in the alignment of the mandibular teeth, when the rest of the teeth have been brought from a most abnormal condition into practically normal functional usefulness, is not regarded as a failure, nor will it so often be by the laity, when cases are accepted and treated from the standpoint of health and function, rather than cosmetics.

I agree with Dr. Kadner that by those "good old well known rules of treatment," along which we have worked in the past, worth while results will continue to be secured, but there is a class of cases, particularly those in which the mesiodistal relations of the maxillary and mandibular dental arches are abnormal, which have to such a degree resisted

our efforts to secure a permanent result, that if a schematizing method, as the essayist calls it, can or has been evolved, which will enable us to differentiate those cases of mesio-distal malrelations, which can be successfully treated and maintained, and those which cannot, then I would want the benefit of that method.

Through many years of painful study and observation, coupled with heroic efforts, I have acquired the conviction, that in many Class II cases, the entire maxillary dental arch is mesial to normal, in relation to the rest of the face, and while it is my experience, that these cases will yield to intermaxillary force, to the extent that the maxillary and mandibular dentures may be brought into what appears to be perfectly normal relation, this relation will be maintained only if the upper teeth have been retruded to their normal position in the skull. So difficult is such a procedure, that I believe we rarely ever accomplish it, but if we do in the child, say of eight to twelve or thirteen years of age, the unerupted molars, which naturally could not be moved distally by the treatment, must have room to erupt, and the forces of occlusion, whatever they are, will provide room for them, by carrying the teeth anterior to them forward again. If there were ample room in the jaw for all of the 16 teeth, such a movement might not take place, but in cases of malocclusion we rarely find sufficient room and often cannot create sufficient room in either arch for the 16 teeth it is intended to accomodate.

If the method Simon has evolved will enable us to tell even approximately whether the upper dental arch is located mesially or distally to its normal position in the skull, then it will enable us to outline a treatment and carry it out, which will bear a rational relation to the diagnosis.

My own conviction is that where the maxillary arch is found too far forward, it is hopeless to expect to carry all of the teeth that have erupted, distally, and yet leave conditions such, that the third molars can erupt successfully. It is folly to thrust these teeth back on already impacted third molars, with the expectation that nature will take care of the condition after our appliances have been removed. There are many cases even of children, in which we must realize that the third molars never can come into a functional occlusion, unless we prefer that some other tooth anterior to it should be sacrificed.

Many men are convinced, after making a great many gnasthostatic photographs and models, that the results of Dr. Simon's investigations are justified, and they are conducting their treatment accordingly. Others like myself, who have more recently begun to study Simon's methods of diagnosis, are still not prepared to pass judgment for or against them. A great many other investigators are working along similar lines and it is quite possible that if we have not already, we may in time discover the truth.

I cannot too strongly commend Dr. Kadner's suggestion, that we all join in the study of etiology of malocclusions and I may say, that is also the object of most of the men who have developed schematizing methods. The impression I get from Dr. Kadner's paper is that diagnosis and etiology are to him a simple matter, far more so than it has been to me. He says, Figs. 5 and 6 represent distal occlusion also, but in this case it was caused by the retrusion of the maxillary middle incisors, but I would like to ask him, what caused the retrusion of the incisors? They may be the only two teeth in the maxillary jaw which are in normal relation to the mandibular jaw and to the skull. On the other hand, the whole mandibular jaw may be retruded, in which event they alone are in malocclusion and all the other upper teeth are normal. I have had cases in which each condition prevailed, as evidenced by the result of treatment.

I do not feel that to simply say that this is a case of distal occlusion caused by the retrusion of the upper middle incisors, can be considered to have exhausted the etiologic or diagnostic possibilities of the case. I quite agree with Dr. Kadner, however, that Pont's index cannot be depended upon in all cases as an exact guide as to the expansion required by human dental arches in malocclusion, nor do I believe Hawley's chart to be an exact guide, and I am also convinced that neither of these men ever claimed that it was more

than an approximation, to be regarded as a helpful suggestion, which seems to be nearly right in a vast number of cases, and the same may be said of the many other methods of arch predetermination, which have been offered to the profession. Possibly the Simon diagnostic methods may also be open to the objection that they are not infallible, but if in hundreds of cases they corroborate, our judgment meets stipend years of successes and failures, shall we not begin to place some confidence in them, or in more exact methods he or others may devise.

I, for one, welcome any aid to diagnosis. After the diagnosis each may carry out the method of treatment which seems best to him.

THE TECHNIC OF SOLDERING AUXILIARY SPRINGS TO LINGUAL ARCHES*

By Professor James T. Quintero, Lyon, France

SINCE the standardization, by Dr. Oren A. Oliver, of the technic of the Mershon removable lingual arch, this appliance is being more and more considered and used mainly as a support for auxiliary spring attachments. It is therefore most important to focus our attention on the following points:

1. The spring must in no way interfere with the tongue or gingiva.

2. Force is best transmitted when constant and immovable relations are obtained between the parts transmitting the force and those receiving it; i.e., the auxiliary spring and the teeth.

We shall examine the technic as taught by Dr. Oliver—at least on his trip to Europe in 1924—and that which the author has evolved since then; each of these will in turn be criticised, and finally conclusions will be drawn. Let us consider the most frequent case, that of an auxiliary spring soldered on the side of the arch to move the premolars, and possibly the canine buccally. Of course the technic remains the same, whatever the location of the auxiliary spring, and this example is only chosen for convenience, to allow easier comparison between the different technics by symmetric presentation of both methods upon the same appliance on a model.

I. Dr. O. A. Oliver's technic

Briefly outlined, the technic taught by Dr. Oliver is as follows:

The arch being properly shaped on the model, and adjusted by means of the blow-pipe, the locks are attached, as *A* in Fig. 1, then:

1. A 0.022″ spur is soldered to the occlusal side of the arch, usually between the canine and first premolar, to prevent the spring from lifting away from the teeth (*B*, Fig. 2).

2. The spring, consisting of a 0.020″ wire, is next attached by soldering on the occlusal side of the arch, between the premolars (*C*, Fig. 3). Both of these soldering operations are done while the appliance is in position on the model.

3. The arch is then removed from the model, and the spring wire is bent in a *horizontal* semicircle bringing the free end backward and around to the buccal side. The horizontal loop thus formed should be as small as possible (*D*, Fig. 4).

4. The wire is then given a sharp distal bend, so as to make it lie *on the occlusal side,* between the arch and the teeth (*E*, Fig. 5).

5. Between the second premolar and the first molar, the wire is again bent at 180°, but in a *vertical* plane, the free end being carried forward and lying between the arch and the teeth, but on the *gingival side,* this time. The

*Read before the First International Orthodontic Congress, New York City, August 16-20, 1926.

wire is cut beyond the spur, and left straight if only the premolars are to be moved, or bent down vertically, opposite the canine, if that tooth also is to be displaced (*F*, Fig. 6).

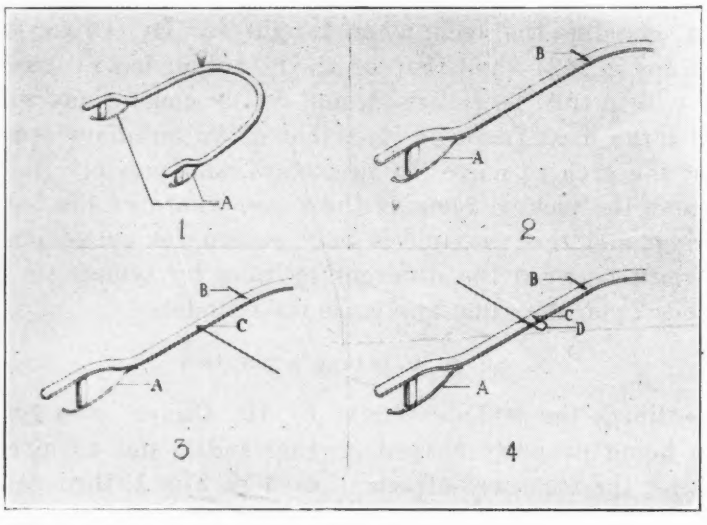
II. CRITICISM OF DR. OLIVER'S TECHNIC

A. Advantages.—This technic has the following advantages:

1. The wire can be soldered in its correct position without difficulty, as the soldering is done while the arch is on the model.

2. The hands remain free—in theory at least—since the arch is on the model, and the latter is usually on a soldering stage. In practice, however, one hand holds the blow-pipe and the other holds the wire to be soldered in position, so this advantage is more apparent than real.

3. The real advantage is that there is less risk of distortion of the appliance than in free-hand soldering.



Figs. 1-4.

B. Disadvantages.—The disadvantages of this method of spring construction come under two heads:

1. *Technical.*—It is dangerous to solder a fine wire to the arch while the latter is on the model because the concentration and reflection of the heat from all sides make it liable to melt the fine wire before it comes into contact with the arch to which it ought to be soldered. This disadvantage can be overcome by exercising great care and skill.

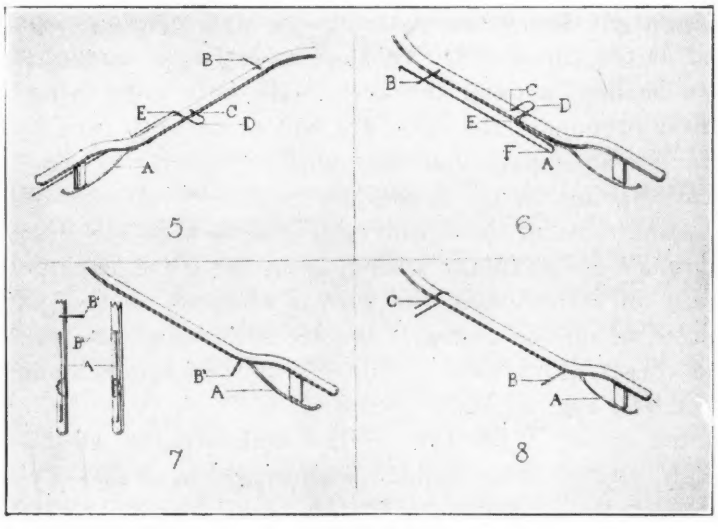
2. *Practical.*—In practice this method of soldering and shaping the spring is cause of two objectionable features:

a. The horizontal loop made at the point of attachment interferes with the tongue and causes irritation. In nervous patients it brings about toying with the appliance, with consequent breakage.

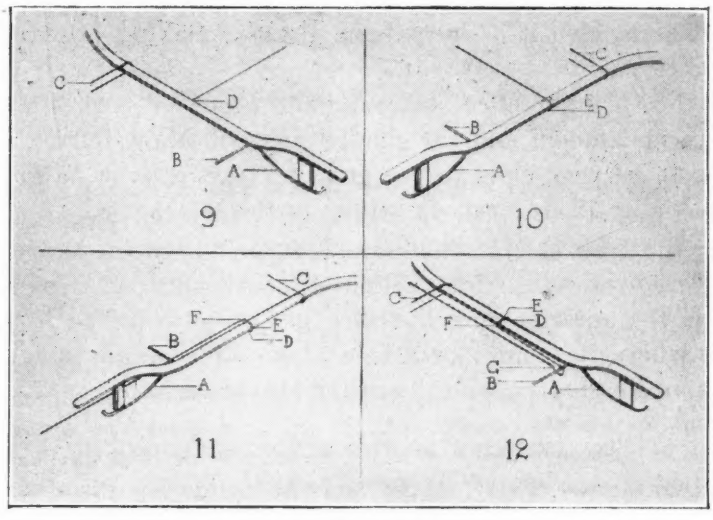
b. The anteroposterior and posteroanterior portions of the spring receive no support whatsoever, except at the soldered end. The spur at the free end merely acts in a preventive way, by holding down the spring against

the necks of the teeth but in no way preventing it from impinging upon the gum, which often happens under the stress of mastication.

In the Oliver technic—which, it must be conceded by all who have put it into practice, constitutes a remarkably standardized method of arch construction,—these practical disadvantages form a dark cloud in an otherwise clear sky, as there seems to be no remedy for them in the technic as taught by Oliver in Europe in 1924.



Figs. 5-8.



Figs. 9-12.

III. THE AUTHOR'S PERSONAL TECHNIC

Let us take the same example and suppose that the arch is properly conformed, ready to receive its locks. The author has added to the Oliver technic a spur at the posterior end of the spring, and a double spur at the anterior end; the horizontal loop at the attachment is changed to vertical, and the technic is as follows:

1. Attach a horizontal spur between the second premolar and the first molar, on the gingival side of the arch, as *B*, in Fig. 7, in such a manner that the spring can be bent around it later. This spur can be made either by soldering a separate 0.022″ wire to the arch, beside the lock wire, B^1, in Fig. 7, or the 0.025″ lock wire may be sent at right angles and soldered in the proper position; in this way both the lock and the spur are made of a single wire and can be attached by a single soldering operation instead of two (B^2, Fig. 7).

2. The anterior spur is made, as usual, of 0.022″ wire and is attached in the usual position, say between the canine and premolar; but, instead of being secured at the tip of the wire, it is soldered far enough from the end to allow it to be bent around the arch, with both ends lying between the canine and first premolar; the ends are cut as desired, care being taken to leave them far enough apart that they will not interfere with the free play of the auxiliary spring, in the space between them. If preferred, this spur may be made single, as in the ordinary Oliver technic (*C*, Fig. 8).

3. Next, solder the auxiliary spring, as in the Oliver technic, between the premolars; only in this method, the wire is soldered on the *gingival side* of the arch, instead of on the *occlusal;* the free end should be perpendicular to the arch and directed lingually. The minutest possible amount of solder should be used (*D*, Fig. 9).

4. Bend the spring right around the arch-wire, as closely as possible, forming a half circle which tightly embraces the arch. This half circle should practically lie in contact with the arch on half the latter's circumference (*E*, Fig. 10).

5. At the proper point, where the spring lies *on the occlusal side*, between the teeth and arch, give it a sharp turn distally, making it parallel with the arch (*F*, Fig. 11).

6. Bend the spring *vertically* around the posterior horizontal spur, keeping the bend wide enough and far enough away to allow it free play. If the spur happens to be very close to the gum, the spring may be given a double curve, as in *G*, Fig. 12, to prevent injury to the soft parts.

7. Bring the free end of the wire forward, between the arch and the teeth, on the *gingival side*. Cut to desired length and end it as in the Oliver technic. Near the anterior end, the wire passes between the branches of the double spur, where it should have free play. If a single spur is used, the spring passes on its gingival side, as in the Oliver technic.

IV. CRITICISM OF THE AUTHOR'S TECHNIC

A. Disadvantages.—This technic has the following disadvantages:

1. The soldering is slightly more delicate, as it is done free handed. This might cause warping if insufficient care were exercised. If warping should occur, it could be easily overcome by placing the arch back on the model and heating it carefully.

2. The appliance is only a trifle more complicated. This is not a serious objection, but is hardly avoidable without doing away with the spring supports.

B. Advantages. 1. *Technical.* There is less danger of burning the parts

in soldering, as there is no concentration or reflection of heat in free-hand soldering, as there is when working on the model.

2. *Practical.* a. The vertical loop around the arch cannot interfere with the tongue and cause irritation, as does the horizontal loop.

b. The spring loses none of its elasticity in the vertical loop, although the latter hugs the arch very closely, because displacements of the wire near the attachment are infinitely small.

c. There is no possibility of injury to the gum from the spring, as it is perfectly supported at the ends as well as in the middle, by the anterior and posterior spurs and by the soldered joint.

V. CONCLUSIONS

While Dr. Oliver's technic marks a very pronounced advance in the construction of lingual arches, it nevertheless seems possible to perfect it as far as attachment of auxiliary springs is concerned. The technic described by the author does away with certain defects of former methods and in particular avoids interference with the tongue and injury to the soft parts by displacement of the springs under stress of mastication. This technic is applicable to the auxiliary springs, whatever their location on the arch. It complies with one of the most important requirements of appliance construction, which was put into picturesque words by one of our greatest orthodontic pioneers and technicians, the late Dr. William G. Law, who always warned his students to "Make them as little like weapons as possible."

DISCUSSION

Dr. Oren A. Oliver.—In discussing Professor Quintero's paper, I must state at the outset that it is based on a misconception of the technic presented on my visit to Europe in 1924. Professor Quintero has given a constructive criticism of, and evolved a technic with advantages over the method which he ascribes to me. Unfortunately, the effort has been an unnecessary expenditure of time and energy, as in only two main instances is the description of my technic correct.

To make the discussion brief it will be best to give an outline of the technic demonstrated in Europe, using in parts the Professor's description and adding corrections as we proceed. (Corrections illustrated by photographs and notes in parenthesis.)

I. Dr. Oliver's Technic.—The arch is properly shaped on the model, and adjusted by means of the blow-pipe.

1. A 0.022″ spur is soldered on the buccal side of the arch, usually between the canine and first premolar (*A*, Fig. 1).

2. The arch is then *removed* from the model, and locks are attached at the end of the arch *posterior* to the half round wire (*B*, Fig. 2). These locks are only placed anteriorly where the anchor teeth are partially erupted, and to avoid impinging on the soft tissues. The lock wire is 0.022″ and not 0.025″ as stated by the Professor in describing his own technic.

3. The auxiliary spring of 0.020″ wire is next attached to the *gingival* side of arch between the premolars (*C*, Fig. 3). The spring wire is next bent in a horizontal semicircle bringing the free end backwards and around to the buccal side. The horizontal loop thus formed should be as small as possible (*D*, Fig. 4).

4. The wire is then given a sharp distal bend so as to make it lie immediately *below* the arch (*E*, Fig. 5).

5. Between the second premolar and first molar the wire is bent again at 180 degrees in a *horizontal* plane, the free end being carried forward below and between the arch and the teeth (*F*, Fig. 5).

II. Criticism of Technic.—The Professor's criticism here leaves him open to misconstruction, as in first paragraph under A, Advantages, he writes, "The wire can be soldered in its correct position *without difficulty* as the soldering is done while the arch is on the model." While later he writes that, "It is dangerous to solder a fine wire to the arch while the latter is on the model," etc. "This disadvantage can be overcome by exercising *great care* and *skill.*" (I do not consider soldering a difficult matter, whether free-hand or on the model, as in the hands of a skilled operator there is little danger of distortion or melting of appliances.)

B. Disadvantages.—

2. Practical—In practice the method of soldering and shaping the spring causes two objectionable features:

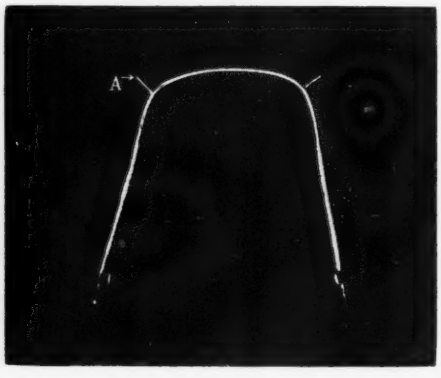


Fig. 1.

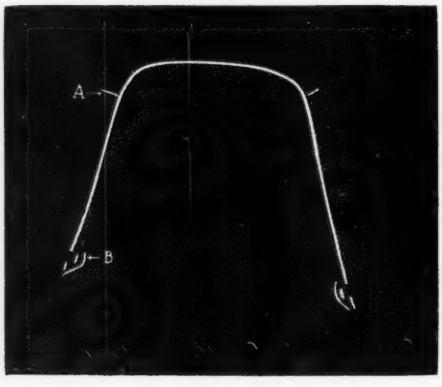


Fig. 2.

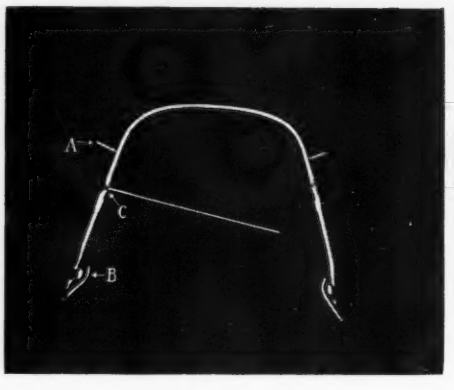


Fig. 3.

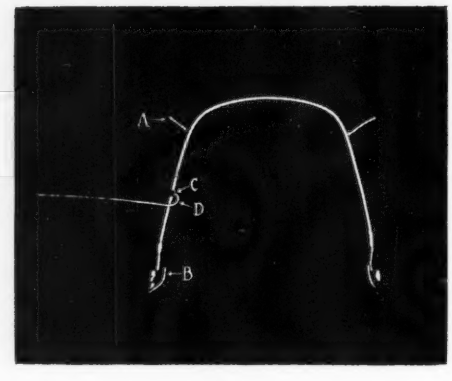


Fig. 4.

(a) The horizontal loop made at the point of attachment interferes with the tongue, etc. (This admittedly objectionable feature has been improved by attaching the wire to the arch at an angle of 45° instead of a right angle [*G*, Fig. 6]; the wire when bent forms a smaller loop which does not interfere with the tongue, and practically eliminates breakage [*H*, Fig. 6]. A complete spring with this improvement is shown in Fig. 6.) (b) The anteroposterior and posteroanterior portions of the spring receive no support whatever, except at the soldered end, etc. (It will be readily seen by referring to the illustration and corrected technic that the portions of the spring mentioned above receive complete protection from the arch, which lies immediately over the posterior bend and partially at least over the anterior portion, thus allowing the spring freedom from the stress of mastication and full play laterally along its entire length.) It should be clearly understood that I have not, at any time, advocated attaching spring wires to the occlusal surface of a lingual arch. One

reason alone, that of stress from mastication, and consequent breakage, should be sufficient to condemn it.

The foregoing notes will suffice to show that the dark cloud in what the Professor very kindly terms a clear sky is evidently a mirage of his own imagining, and it is to be regretted that he has been forced to evolve protective measures for a technic which has, in its principal features, certainly never been used or taught by me.

III. Professor Quintero's Technic.—Having made it clear I think, that the professor's description of my technic is inaccurate in the greater part, it perhaps will not be out of place to point out some objectionable features in the technic ascribed to me by the Professor, and also in his additions.

The horizontal loop, *D*, Fig. 6 has been removed, but there still remains a semicircle of wire exposed to stress, particularly at *F*, Fig. 11. The posterior portion of the arch is supported by the horizontal spur, but this forces the gingival portion of the spring to assume a lower level than is desirable. This spur, together with the lower anterior spur, prevents the spring tucking slightly below the arch, leaving a space between the latter and the teeth.

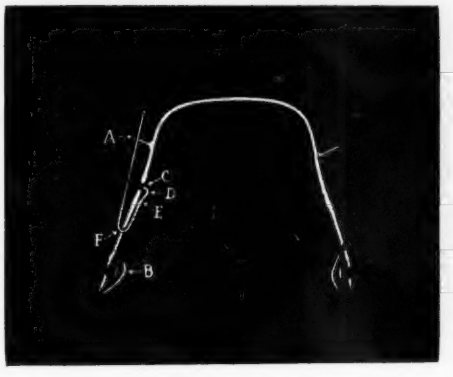


Fig. 5.

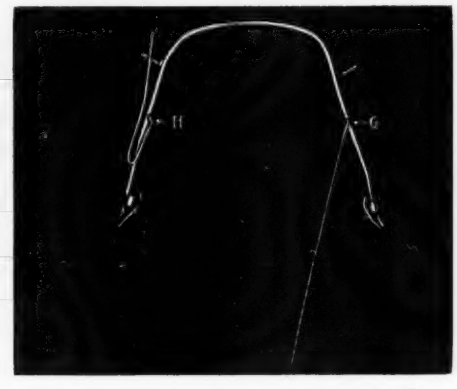


Fig. 6.

These spurs, particularly the lower anterior, must impinge upon the soft tissue unless bent occlusally when the force of spring could not be directed against the teeth at the most beneficial point; i.e., just above the gingival margin, and although the Professor mentions that the lower anterior may be dispensed with if preferred, it seems to me that it would always be needed as owing to the vertical loop the anterior portion of the spring has its force directed gingivally. Furthermore the spring derives its lateral force from the weakest point marked *E*, Fig. 5, whereas in the corrected technic it will be seen that the spring obtains direct lateral force from two points (*E* and *F*, Fig. 5), these points are moreover, completely protected by the arch.

The other points have been covered earlier in the paper with the exception of the more slightly complicated appliance, which obviously could not be avoided. In conclusion, to the timely advice given by late Dr. W. Laws, I would add, "But if they must be weapons, then use them with the greatest effect."

THE TEACHING OF ORTHODONTICS*

By J. H. Badcock, L.R.C.P., M.R.C.S., L.D.S., London, England

YOU have much important and interesting business before you, and I do not propose to occupy more than a few minutes of your time in introducing to your notice the Report of the Education Committee of the B.S.S.O. on "The Teaching of Orthodontics." You have each received a copy, and I trust that some, if not all, of you have had time to read it. A word or two as to its history may not be out of place.

The prevalence of irregularities of the teeth in these islands, the need for treatment, and the knowledge that this need was not being efficiently met, were the primary reasons for the foundation of the B.S.S.O. on the initiative of Mr. George Northcroft in 1908. The chief reason for this state of things appeared to be that the subject of orthodontics occupied altogether too insignificant a place in the curriculum of our dental schools, and among the requirements of our universities and colleges for qualifying degrees and diplomas.

As the Society gained in numbers and knowledge and could claim to represent the orthodontic opinion of the British Isles, it seemed desirable that it should formulate its views on the subject, and draw up some scheme which might serve as a stimulus and guide to schools, teachers, and examining bodies alike. Accordingly a committee was appointed to this end. It reported in 1922, but it immediately became apparent that its report was already out of date and that revision was necessary. This revision has now been made.

The fundamental principle underlying the scheme is that orthodontics is not merely an art, but a science, and that unless the art be surely founded on the science it cannot grow to perfection.

The main points of the report may be briefly summarized as follows: Undergraduate instruction, and facilities for postgraduate instruction in orthodontics in all dental schools. It should be compulsory on every dental student to attend a special course of instruction in orthodontics so that "he may at least know the elements of the subject. Knowing these, he will have a basis on which to build, and, if he so desire, may set out to become specially skilled" in this branch of practice. If his desires should not be in that direction, he would then be in a position to realize the fundamentals of treatment in any particular case, the possibility of success in hands more skilled than his own, and above all he would possess sufficient knowledge to enable him to avoid wrong treatment.

It is earnestly recommended that greater stress should be laid on the subject of orthodontics, and that it should form a separate subject in the examination for a diploma or a degree.

*Read at the Congress of the European Orthodontological Society, May, 1925.

It goes on to suggest a model scheme of undergraduate education in orthodontics, to consist of:

1. Technical work in the laboratory, accompanied by lecture demonstrations.

2. Lectures on the theory and practice of orthodontics, to be followed by a class examination.

3. Clinical work, including a dressership of not less than three months in the orthodontic department; and it outlines the subjects to be included under each heading.

Postgraduate teaching might be of two classes: (*a*) As for undergraduates, with such modifications as might be necessary to meet special conditions. (*b*) A more detailed course for those fitted to receive it.

Postgraduate courses for short periods held at times more convenient to dentists in practice would probably be found most suitable.

Then follows, as an appendix, what may seem at first sight rather an elaborately expanded syllabus, suggestions for case taking, and a long list of references to literature bearing on the subject.

It should be clearly understood that this is not in the nature of an attempt to thrust upon any school or teacher a ready-made scheme of orthodontic instruction; but rather an effort to suggest broad lines on which each individual might base his teaching, and to indicate available sources of material.

It is a particularly happy chance which has enabled the B.S.S.O. to submit this report, at the moment of its publication, to such a distinguished body of specialists as the E.O.S. for their consideration and criticism; and I am very grateful to your Secretary for giving me the opportunity of doing so on their behalf.

Gentlemen, your comments will be very welcome, and I am sure very valuable.

DISCUSSION

Dr. Quintero said he very much regretted he had not had an opportunity of studying this report, because just by glancing through it whilst the essayist was delivering his paper he had seen what appeared to be a great many interesting points. He was not prepared to discuss it fully, but if he might be allowed, he would like to outline the way in which orthodontics were taught in the dental schools in Lyons. He explained that the class was divided into two parts; the instruction was not as complete as he would like, because he had not the instructors below him to help him, and so had to do it all himself, and had not much time to devote to the work. Unfortunately, they had not been able to install a technic class, as Mr. Badcock suggested, but had a clinical class and a lecture class, both given by himself. In the clinical class the students of the last two years of study were required to treat one case; the case was given to a second year student who worked in conjunction with a third year student, so that by the time the end of the treatment was reached the work was not left over and abandoned, but as the second year student came into his third year he would see the patient again in the fall and continue the work with another student of the year below. All the cases were carried through in this way until completion. Before any treatment was commenced he required his students to thoroughly examine the case, and he mentioned that he had brought to the meeting two case reports, one of them specially interesting, which he would pass round to show how the student had prepared his report, and would illustrate later with slides. He said that this case report was awarded a prize recently in Brussels at the

meeting of the French Society of Orthodontics, so as to give the student an incentive to go on with the work he had done, and to encourage all students to continue. It would be seen, therefore, that the course comprised two years of work, the second and third year, and the cases were handled completely by two students all through the period of treatment.

Mr. Packham apologized for not having sent out copies of the report earlier.

Mr. Cale-Matthews said the report covered such a vast amount of ground and was a matter of such extraordinary interest that he thought a discussion by the few who were particularly interested in the teaching of students, both graduate and postgraduate, would probably fill the greater part of the conference if discussed in detail. He felt that any attempt to discuss that work in detail would be wasted because of the inability of the general body of the members to follow it. He added that some of those present might know that his interest in the teaching of orthodontics was very great, and if one might learn from past experience he had found within the last six months one thing to be exceedingly valuable and that was the appointment in the schools of qualified clinical assistants to help the teacher mainly responsible in his work, so that the actual clinical work of that department might be carried along by the assistant as soon as the diagnosis and treatment had been decided upon by the officer in charge of the department, and enable him to devote his time to his lectures, following the lecture by an actual clinical demonstration with his students, and at the same time allot to them the work he desired them to do, and subsequently hand them over to the clinical assistants to supervise their progress, and in case of difficulty there could be a consultation between student, clinical assistant and responsible teacher. It was only on broad lines of teaching one would get any results from the efforts to give the student today some knowledge of orthodontics. He hoped the results of this exceedingly important report of the B.S.S.O. would have the effect of influencing the licensing bodies of this country to give far more importance in their final examination to the subject of orthodontics than they have deemed necessary in the past.

Mr. Friel said he was not prepared to speak on the subject and could only state the method adopted in teaching in the university to which he was attached so far as the lectures were concerned. He had tried to follow out the report to the best of his ability, but with regard to clinical work he had found it impossible to give each student cases to treat. The majority of cases at the dental hospital took three or four years to finish, and it meant that one student treated only one case during his period at the dental hospital, and if it was successful he went away with the idea he could treat any case, and if a failure—orthodontia was a rotten game! So he felt it was far better to treat all the cases himself and get all the students when they came down for the three years to watch him on the treatment, and give them some training in soldering and the making of appliances, etc., but to do the actual treatment of patients himself. Another reason why he was rather afraid to give patients over to a student was the bad time the patient very frequently had at the hands of inexperienced students—not from any wish on the student's part to hurt the child, but because they did not know how to do otherwise—and the results were not satisfactory. He thought the students gained a better grasp of the subject if they saw a great variety of cases being treated and at many different stages.

Dr. Coebergh said that he had not studied the report, but had read it and thought that some of the suggestions would be appreciated by members from foreign countries. He said that he had helped in orthodontic work in the University of Utrecht. He believed that some points in the report were of great value, but at the same time he was of the opinion that it would be wise for the actual treatment to be done by one person, and not to change from one dentist to another with different ideas and other methods. He had heard something about the clinical work of the students from the last speaker, and he believed from what he had seen that two-thirds of the students could not manage a case until the apparatus was in the mouth, and also he did not consider it of any value to have one student to work on each patient.

Mr. Northcroft said he thought Mr. Badcock probably presented the report for the consideration of the meeting in the hope it might receive criticism and comment, and, possibly, appreciation from our European confrères. Those whom the President had called on were

already very familiar with this report, having sat on various committees compiling it, and he did not think it was for him to make any comment on it. It represented a great deal of thought, and he hoped on consideration it would receive much appreciation.

Dr. Hipwell suggested that an interchange of professors would be a good thing if it could be arranged; one year a professor might go from London to spend two or three months in America, and the next year a professor from America could come to London. We could all learn from one another, and he thought much might be gained if something could be done on these lines when the orthodontic school in Europe was in a more or less embryonic state.

Mr. Badcock replied that it had been very interesting to hear what had been done in Lyons, and the suggestion of the President as to interchange of teachers was, he thought, a happy one. It seemed to him that if such a thing could be accomplished it would be advantageous. The more each country was brought into contact with others the better for all. We had here in England at Guy's Hospital a travelling scholarship, which was awarded every two years, and the student who was fortunate enough to obtain it went to either some European country or America, or any other he might select with the approval of the hospital authorities, and had his expenses paid for a certain time. He was quite sure the principle was an exceedingly sound one.

THE USE OF DIAGNOSTIC AIDS IN ORTHODONTOLOGIC TREATMENT BY THE GENERAL PRACTITIONER*

By Dr. Coebergh, Utrecht

WHEN we take a little rest after our daily task is finished, we do not always fly to recreation, but often try by reading scientific books or periodicals to augment our knowledge. For many practitioners this is a recreation. It happens sometimes that we discover new points of view, even in books or papers written many years ago. Reading them over again often gives a totally different outlook on ideas that are generally accepted as obsolete. It is the same at our meetings, when we come together to hear or look at something new, or often to hear the repetition of old facts and methods in a new light. We must not condemn such repetitions when their intention is to cast a broader view on a certain subject under discussion.

I wish now in something like chronologic order to speak of the development of "aids in diagnosis." What is the meaning of this term "aids"? It is difficult to tell you, and it is also not easy to make clear what we mean by the word "diagnosis," especially in orthodontia. In some textbooks we find nothing about diagnosis. All the work to be done before beginning treatment is brought under the headings "classification and etiology." Some authors give under "diagnosis" only the facts we can see on the models, the abnormalities, etc. I wish to suggest that diagnosis is the assembly of all factors which we can find by the assistance of anatomy, physiology, etiology and function.

A diagnosis always remains something uncertain, something like a hypothesis, because often the exactitude or inexactitude has to be demonstrated by the success or failure of the treatment. Moreover, with orthodontia we sometimes have to alter our diagnosis at a visit of the patient.

In the textbooks and periodicals before 1900, the year of the sixth edition of Angle's "Malocclusion," we find so little that is important concerning diagnosis that it is not worth mentioning. In Angle's textbook we find the first "aids," namely, the preparation of good models, and a classification, based upon the position of the first maxillary molars, and the occlusion. The remaining "aids," such as the normal line of occlusion and the symmetry of the face, are, with the classification in the Angle method, sufficient to produce good results. Much has been written of the pros and cons of this method. But Angle in his seventh edition (1907) still more strongly urges the fact that his theory is useful, nay, indispensable.

Many practitioners in America and Europe, nay, over the whole world, have adopted Angle's theory as a dogma, and by practicing his method and by means of lectures, have made propaganda for it. However, some of Angle's

*Read before the European Odontological Society, May, 1925.

greatest admirers have come to the conclusion that there are some weak points in his theory, through experiencing difficulties, sometimes failure, when following his ideas. But in spite of that Angle is still a great master. Do you know any master who is entirely without faults? The faults made by his pupils are perhaps caused by inaccuracy on their part in following his ideas. After the seventh edition of Angle's book in 1907 some papers were written showing the weak points in his system; by such means improvement is attained. Especially notable was the trend to discontinue judging a case by the eye only. We see a tendency to obtain an accurate viewpoint of methods. The main point was to solve the problems of classification; the preparation of good models; the imitation of the anatomic relation of the dental arches to the jaws and skull; the construction of the normal dental arch.

The first classification of anomalies that claimed the general attention of the profession was the idea of Angle. It is very remarkable that this classification has been, up to now, the only accepted one by the whole world. Though it is assuredly incomplete, followers and even opponents use it still. It seems to be the easiest way to express our ideas in papers and discussions, and in my opinion the fact that Angle's teaching causes so much discussion shows there is much good in it, though it has been condemned by some authors.

Or is it our fault, that we are too blind and stupid, and mistake bad for good? After all, there is not one other classification that is accepted for general use. Some authors have made an attempt and they must be praised for their work and good intentions, but they have failed to fulfil what we want. I will not call your attention to the long list of names of authors who have written on the subject. It would, however, be very profitable to try by cooperation to get a uniform classification and nomenclature; for instance, at the First International Orthodontic Congress in 1926. The first to recommend the preparation of the model on definite lines was Angle, but his explanation was too vague, and, as good models are an essential to our work, it is no wonder that we encounter many trials in our endeavor to reach perfection. In the first place we have to mention the work of Northcroft. He was the first to propose cutting all models in the same way, making them similar in height, etc. He designed a very useful instrument to mark the height on models of irregular form, and also a plaster plane, which enables us to get rectangular proportion on the art portion. The changes and improvements that came in the literature after this are too numerous to mention.

The study of models, and of course of morphology and etiology, brought many to the conviction that it was insufficient to judge symmetry by the eye, or by an imaginary line. When we examined models which had the backs cut parallel with the position of the last teeth thereon, it was of course an exception that this line was in perpendicular rectangular position with the median line of the anatomic portion. In default of better methods we often deceived ourselves. We did not know at that time a useful point or line from which it was possible to judge symmetry.

Many of you remember, with me, in 1908, the first official meeting of this Society in Berlin. Korbitz made the proposition to proceed for the judgment of symmetry from the raphe, a constant anatomic line of 1.5 cm., just behind

the central incisors on the palate. His proposition was very strongly criticized at that meeting, but later on it was accepted as a general rule by all practitioners and even by scientific workers. The method was very simple. With a sharp pencil he drew a line on the palate, lengthening with a piece of wire the line of 1.5 cm. on the raphe; he then got the median line on the model. With the same wire and a plumb-line he brought over the median line on the back of the model, and so on the lower model, also on the art portion of both models. For registering the symmetry or asymmetry of the teeth he used a visiting card with a triangular opening just in the middle. Through the opening you had to get the exact line on the model. I remember very well that I came home enthusiastic with this idea, and after trying the method, found it a revelation, even more so when I used a piece of transparent celluloid instead of cardboard. Admiring the idea but not content with the simple method, several men made improvements. Zielinsky brought out his orthometer one year later, an instrument with which we could study the symmetry on the models, fixing them on a wooden slide with a millimeter scale and viewing along a fixed wire that was movable up and down. Grunberg, Friel and others again improved on Zielinsky's instrument with their symmetroscopes. But in spite of these improvements there was still no accurate scientific method; with them all it was left to the eye to form a judgment.

This fact was a stimulus to Van Loon (doctor of medicine and dentistry, and an excellent anatomist) to work for a scientific method, and the results of his studies we all know. With the aid of a cube craniophor he was the first to work out a complete method for the reproduction of the anatomic relation of the human dental arches to the jaws and the skull. He gave the stimulus for the research of Simon, Dreyfus, Schwartz, Wustrons, and perhaps others, to make this scientific method fit for the orthodontist. Together with their gnathostatic method, they all use an instrument that determines the symmetry. The "symmetrograph" of Van Loon was the first that marked the lines on the model with sliding metal pins, and it is also arranged to mark the height of the palate. Following this method, we get models with a totally different aspect to those to which we were accustomed. Where ordinarily the line of occlusion lies horizontally, it lies now in anatomic relation to the generally accepted "Frankfurten horizontale" and the art portion represents this line. The height of the models must be uniform in all cases.

In the sixth edition of his book Angle considers it necessary to bring the abnormal dental arches to normal occlusion. "Normal occlusion" the *secretum apertum*. We saw it sometimes on models, very often in print, very seldom in the living subject, but it was a magic word. Then the question arose, how to diagnose the necessary steps from the abnormal to the normal. Perhaps not so difficult for the man of experience, but a hard task for the pupil and beginner.

It was in 1904 that Hawley published his method, according to the Bonwill method, for geometrically constructing the arch for full dentures. He constructed a set of diagrams applicable for all cases that were not mutilated. For several years this method was followed by many in America and Europe, and soon there came criticism and thereby improvements. The defect

of this method was, that the diagram had to be laid on the model in accordance with the buccal fissure of the first maxillary molar. This was in 1904, and we did not know the value of the raphe. But at that time it was a welcome aid in orthodontic diagnosis. In Angle's seventh edition we find no word about this improvement. At the same time we already knew some statistic data about the breadth of the normal dental arches in relation to the measures of the incisors of the maxilla, from the admirable work of Campion and Pont. With these data it is possible to predict the necessary expansion or contraction, in a given case, between the premolars and first molars. On the foundation of the Hawley method and the known measurements, Stanton, with the engineer Hanan, Hellman, Percy Williams, Sved, and Lischer, built their methods, to get a true mathematic, mechanic and graphic normal arch construction.

Stanton, and later on Schwartz, constructed an apparatus, called the "occlusograph," enabling one to draw on paper the abnormal, and then the normal arch, eventually putting the one on the other for comparison. These methods are criticized very severely, but the authors adhere to their standpoint.

Now what is the reason that I have dared to ask your attention to all these well-known facts?

1. In the first place, I would like to remind you of all these facts with the names of the different authors.

2. In the second place, I will give you my opinion on aids in diagnosis.

a. For practical purposes I do not need a classification. The description of a case has to tell us all the normal and abnormal points which are present. It is impossible to do this in two or three words, because that only gives a superficial impression. In default of better, we can use Angle's classification in conversation and meetings.

b. As to the preparation of models, I take the standpoint that for practical purposes the placing of the models with the anatomic portion on a horizontal line gives me a better impression of the reality than the position of the models by the gnathostatic methods of Van Loon and Simon. Also for practical purposes this gnathostatic position does not interest me, because some movements that seem effective are impracticable. For instance, it is impossible up to now to turn the whole maxillary and mandibular arches, with a part of the jaws, round a certain axis. But I do believe that for scientific research the anatomic relations made by anthropologic methods are a necessity, and I hope that our dental scientists will bring us as soon as possible certain data that have some value for practical purposes. We do not need apparatus, but the results gained by them.

c. The judgment of symmetry and asymmetry by a "symmetrograph" I think is indispensable.

d. For the predetermination of the arch I use a method published in the 1912 *Proceedings* of this Society, held in Brussels. It is a combination of Hawley's method with the measurements of Pont. I mentioned in that paper especially the study of normal, or nearly normal, models, and the necessity of

putting on paper the form of the zygomatic arches, as their shape is nearly always similar to the shape of the upper dental arch. The angle of the zygomatic arch gives me an idea of the necessary angle for the dental arch in the region of the canines.

e. I use three-point calipers, a very valuable instrument for taking measurements of models or of diagrams on cardboard.

f. A profile and full face photograph accurately taken are in many cases indispensable. When these are repeated, care should be taken that they are exactly in the same position and the same size.

I have called your attention to these old facts, and my own "aids to diagnosis" to come to this concluding question. Pray tell us which are the aids for diagnosis that you use as a guide for the practical work, and tell us the truth. I look forward to hearing at this meeting the opinion of our Society, and later on to be able to read it in the *Transactions*.

Once our President, Dr. Hipwell, mentioned this saying of an American ambassador: "One must bring a new idea and a joke." In my paper there is no new idea and no joke, but I hope, Mr. President, that it will not be a failure in your eyes. I believe that a paper is only a success when it opens up the opportunity for a fruitful discussion.

DISCUSSION

Dr. Barrows said he did not know that he had anything special to say on this subject: the importance of a true diagnosis was a very vital thing before one started treatment. He quite agreed with Dr. Coebergh that the subject should be thoroughly investigated, and the more aids one could have for the different methods of diagnosis which combined them all—choosing the most applicable—the better one was able to carry on the treatment. He wished to compliment Dr. Coebergh on his excellent paper.

Dr. Levy-Davidsohn said she fully agreed with Dr. Coebergh as to the importance of diagnosis. In her practice she used only the system of Dr. Simon of Berlin, and she thought a case was very easy to treat after that.

Dr. Oppler said that he spoke the English language too badly to tell what he meant, but he might say that the method of Dr. Simon was not good. He had discarded Simon's method because the basis of the theory of Dr. Simon was wrong theoretically and practically. He had himself tried Dr. Simon's method and found it unsatisfactory, and he had used the method of Dr. Angle. He had written a book and had told in that that the method of Dr. Dewey had gone farther than that of Dr. Angle.

Dr. Kadner said he would only say that he was convinced of the correctness of Dr. Oppler's statement. He knew the diagnosis of Simon was not logical, and all orthodontists now said that the diagnosis of Simon was wrong.

Dr. Dreyfus said he agreed entirely with Dr. Coebergh. Dr. Angle was surely a great master, but the fact of his being a great master was not the important thing, but what was good. Again Dr. Coebergh said that Dr. Simon's method was the best, and his own opinion also was that it was a good method when modified. He had heard the previous week in Brussels Mr. Lockett's communication (the same he thought he would give today) and he thought if the results were unequal it was because the basis of diagnosis and the treatment were wrong, and they would hear also in another communication that afternoon by Dr. Quintero that there were cases where if one took the Angle method one would have a wrong diagnosis and a wrong result, but if one took that diagnosis with Simon's method modified you would have a good diagnosis and a good result.

Dr. Levy-Davidsohn said she was quite sure every system had its advantages, but she felt very astonished that one system should be condemned which found such appreciation in

America. Dr. Simon had read a paper in America the previous year, and it was published in the December number of the INTERNATIONAL JOURNAL OF ORTHODONTIA, and she thought there must be something in a system which had found such appreciation there. Those who were interested should read the December issue of the INTERNATIONAL JOURNAL, where the whole lecture was published.

Dr. Quintero said he agreed with everything Dr. Coebergh had said except on one or two points. The median plane was only really median in 80 per cent of cases, which was not a sufficient percentage to adopt it as a general rule. Therefore if one took the median raphe as a basis for the median plane one was wrong in 20 per cent of cases and that was too great a percentage. Therefore, there were other methods of finding the median plane which were more perfect than taking it from the raphe. On the other hand he did not think normal occlusion was the only aim of the orthodontist; he thought there was a good deal more in orthodontia than merely that occlusion. He thought "orthodontia" was rather limitative as a term, and he thought the real term should be "dentofacial orthopedic," which was much more comprehensive and went much beyond normal occlusion. Concerning the Hawley diagrams which Dr. Coebergh mentioned, of course they were very good in their time, but he thought one had gone beyond that time because careful examination of those Hawley diagrams showed that they were all exactly similar, and the only difference was the difference of size. Now if you tried to make all the jaws of your patients exactly alike with only a difference of size you were not doing the right thing, because your patients were not all exactly alike; you had patients with heads of different shapes, and you could not accommodate the same arch in different heads. Angle's classification in its time was a very fine thing, but he did not think it was the right thing nowadays. He thought science had advanced and, without going into details, he thought it was rather difficult to accept the first maxillary molar as the basis for diagnosis because Angle bases that on the assumption that the first maxillary molar always erupted in its normal position; we knew this was not true. Finally, as regarded cutting the model, there was a good deal to say for and against the cutting of models in the manner described by Simon or the Angle method; he thought that for simple cases the Angle method was sufficient, but in cases where we had really marked deformation it was better to cut the model according to the method advocated by Simon and others.

Dr. Rojas said that in California Dr. Angle had pointed out at one of the meetings the malar process as one of the keys for diagnosing a case. The first molar grew just underneath the malar process. If the first molar was forward of the malar process it meant that the first molar was too far forward and must be moved backward, and so they took the malar process as a key for diagnosing a case. Dr. Angle did not take the first molar any longer as the key but the whole distocclusion of the mandible and maxilla—not only the first molar; now besides that he took the pattern and also the shape of the arch in order to diagnose a case. For instance, a square arch should belong to a square face, and a square tooth for a square arch and square type of individual.

Dr. Coebergh said that he was very sorry he could not deal with all the discussion, but would confine himself to a few remarks; Angle's method and classification were not appreciated now as they were in 1907.

THE ETIOLOGY AND PATHOGENESIS OF ANGLE'S "CLASS TWO" MALOCCLUSION*

By Dr. Corrado D'Alise, Naples, Italy

ETIOLOGY is the science which studies the cause of disease. Pathogenesis studies the mechanism by which disease develops and progresses. In speaking of the etiology and pathogenesis of Class II malocclusions (Angle) I will not refer to the scientific value or otherwise of the Angle Classification, which I consider the best among those published, because it represents an anatomopathologic condition of the dental arches and jaws. This classification is useful to the orthodontist, and especially the beginner, because it enables him to form a sound opinion on what has to be done; the classifications of others tend to make this more difficult.

The dentofacial deformities of this class are certainly the most numerous and are the most important in regard to the esthetic and fundamental side of the human organism, particularly in relationship to the two principal and fundamental functions of animal life—the digestion and respiration.

This class of case is increasing with terrible rapidity, and for this reason our efforts must be directed to their prevention rather than to their cure.

With this object of prevention in mind I briefly present to you today my views on the etiology and pathogenesis of Class II cases, hoping to present a more complete exposition at a later date. This knowledge is essential to logical and rational treatment, and even more essential for prevention, if we are to rise from the rut of empiricism and technic.

Dr. Angle, in the seventh edition of his invaluable book, "Malocclusion of the Teeth," page 44, says: "When from any cause the lower first molars lock distally to normal with the upper first molars on their eruption to the extent of more than one-half the width of one cusp on each side, it must necessarily follow that every succeeding permanent tooth to erupt must also occlude abnormally, all the lower teeth being forced into positions of distal occlusion, thereby causing more or less retrusion, or lack of development, or both, of the entire lower jaw."

This condition of distal occlusion is the determining characteristic of this great class, of which there are two divisions, each having a subdivision. The great difference in the occlusion of the teeth in these two divisions is manifest in the positions of the incisors, the one protruding and the other retruding.

According to Angle, the difference between the two divisions is in etiology and in their pathologic entity; whereas I consider them to be pathologic variations of the same morbid process, etiologic and functional.

Hitherto, our knowledge of the etiology of dentofacial deformities has been limited to a few obvious causes, which undoubtedly contribute to their

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production, but do not always represent the most important causative factor. In addition, fundamental causes common to other deformities of the human body were only casually referred to, if mentioned at all; these causes include—heredity, bottle-feeding, rickets, adenoids, endocrine derangement, and hypofunction of organs.

Although denied by some, heredity undoubtedly represents the principal cause of these pathologic processes. Biologic research in the vegetable and animal kingdoms demonstrates this very clearly. As orthodontists we see irrefutable proof of this tendency in children with dentofacial deformities; which proof is supported by an examination of the parents.

Consideration of the relationship of the dental arches to physiognomy of race and family convinces us of this fact; it is axiomatic that the children resemble their parents.

Dr. Angle, in his book, page 60, says: "The mouth is a most potent factor in making or marring the beauty and character of the face, and the form and beauty of the mouth largely depend on the occlusal relations of the teeth." It is an established fact that not only the somatic characters are inherited, but also the psychic ones, either normal or pathologic. And it is proved also that in the animal and vegetable kingdoms the somatic characteristics both normal and pathologic may be modified in the offspring; and man is no exception to this rule.

Clinically, we see striking proof of this in the frequency with which pathologic somatic characters in the jaws and face of the parents are accentuated in the offspring and the increased frequency of malocclusions of permanent and deciduous teeth are proof of it. Given, then, that heredity represents one of the principal factors of malocclusion, as is proved by the rapidity of the increasing number of cases of irregularities of the deciduous teeth, it is our duty to seek for all other causes which contribute to and increase the heredity predisposition.

These other causes may have been the primary cause in the individual's ancestors, and a knowledge of them is essential for prevention and cure.

Causes may be divided into two groups: (1) Congenital. (2) Acquired. Though it may not be possible to differentiate between them, this division is necessary for purposes of study. Among the congenital causes may be placed all pathologic conditions (acute and chronic infectious diseases, constitutional diseases, traumatism, poisonings, autointoxications, etc.), which, acting on the mother, may disturb the regular development of the fetus. Among the acquired ones, and which interest us more especially, are included all those acting directly on the child. The latter include bottle-feeding, adenoids, rickets, endocrine derangement, hypofunction, etc. Other causes are those, which until recently were thought to be the primary causes of malocclusion, whereas they are mostly only symptoms and consequences of the hereditary congenital and acquired causes of diseases of early infancy.

Owing to the brevity of this paper I cannot give details of the various causes of malocclusion mentioned above, and will confine myself to Class II malocclusions.

Bottle-feeding, when it is not the consequence of maternal indifference, is an artificial means of feeding the child, necessitated by pathologic conditions present in the mother, which do not permit her to nurse her child without great damage to herself and child.

Bottle-feeding is always a substitute for the maternal feeding, and, as such, is not ideal. Apart from the difficulty of finding a substitute which answers to all the chemical and physical qualities of maternal milk, there is the important question of how it shall be administered. In this connection I should like to mention the interesting study of Dr. Dreyfus—"An Improved Type of Feeding Bottle"—in which he has demonstrated how different it is to suck at the mother's breast and from the common type of bottle, and how, by a nipple invented by him, we may reproduce in the child almost completely the natural function of sucking. I hope that the knowledge and the use of the Dreyfus nipple may prevent in the future much damage from this source.

Errors from insufficient mastication and from improper preparation of food, and from the general habit of the present generation of masticating insufficiently, I have spoken of elsewhere, particularly at Naples last October, in a paper on "The Function of Mastication and the Development of the Nasal Fossæ," when I showed that for the normal development of the nasal cavities, it is necessary to secure an efficient bilateral mastication.

Adenoids and rickets affect many children in infancy, and we see a close relationship between these and other chronic manifestations of this age which affect various organs, such as rhinopharyngitis and otitis, adenoids, chronic conjunctivitis and defects of accommodation, caries of the deciduous teeth, and of the first permanent molars, malocclusion of the deciduous teeth, lymphatism, scrofula, etc., the causes of which are not well known, but which I think are of the same nature.

Rickets for us, as orthodontists, is a very important factor. In another paper I have spoken of rickets in relation to malocclusion, and here I will repeat briefly something of what I said then. The mouths of individuals whose occlusion is either Class II, Division 1 or Division 2, show that the cavity of the mouth proper in both is restricted in size, the difference being in the arrangement of the anterior teeth alone, which gives a different expression to the face, but the difference in mastication and respiration between the two types of cases differs only in degree.

Here I want to make a general statement which will help us to a better understanding of the etiology of this class of malocclusion. Habitual mouth breathers develop a characteristic aspect of the face. Between this classical type and the nose breather there is a graduated series of individuals suffering from insufficient nasal respiration which, although not obvious to the layman, cannot be neglected by the general physician and less by the orthodontist. In my opinion the individual belonging to Division 2 is a mouth breather, but of less degree than in the one belonging to Division 1, as can be demonstrated by a more accurate examination of the individual belonging to both Divisions Class II.

There is no doubt that with insufficient nasal respiration we have a disharmony of the forces which govern the eruption of teeth and their correct

position in the arches. Such an event is very frequent during the eruption of deciduous teeth, with consequent malocclusion. These malocclusions occur in the deciduous dentition, and except in rare cases are followed by similar ones in the permanent dentition.

Study of the mechanism of eruption enables us to understand the production of Class II malocclusion. Individuals predisposed by heredity to nasal insufficiency are compelled to breathe with the mouth open. This condition disturbs the normal equilibrium of the forces, as is well described by Dr. E. Angle in his book. To this I add that rickets is almost constant, and by its calcium deficiency facilitates the abnormal development of the jaws and position of teeth.

The two divisions of Class II have a period of formation in common until the eruption of the superior incisors. Then, if the requisite conditions are present, viz., heredity, grave degree of nasal stenosis, deficient masticatory function, insufficient development of the lower lip, the latter do not succeed in preventing the natural tendency of anterior upper teeth to go forward and upward. Then the individual in swallowing is compelled to put the lower lip between the maxillary and mandibular teeth. This then becomes a habit, which some people cannot avoid, even when the correction of the malocclusion is accomplished.

When, on the contrary, the lower lip succeeds in controlling this movement of the maxillary incisors, we have the Division 2. I have seen two families where the parents were both affected with Class II, Division 2, but some of the children were Division 1 and others Division 2.

Between these two divisions we may have even another, or a third division. This is very rare. The lower lip having controlled the maxillary central incisors does not succeed in controlling the lateral incisors, so that in closing the mouth the lower lip rests between the maxillary centrals and laterals.

In conclusion, we may say that the causes of Class II malocclusion are many: heredity, adenoids, rickets, insufficient function during suckling and faulty mastication later. The two divisions of this class have the same causes which vary only in degree as mastication and respiration vary.

Lastly, between the two divisions of this class there is a third division in which, while the superior central incisors are inclined lingually, the lateral incisors are inclined labially.

DISCUSSION

Mr. Campion said he had listened with great interest and pleasure to Dr. D'Alise's paper. He had come, as the result of some years' study, to challenge Angle's classification. He believed it to be one of those superficial generalizations which all of us came to and which the whole of human history is full of: a generalization which is founded on and involves a scientific examination of all the facts and which, as our knowledge accumulated, we discarded. That he believed to be what would happen with Angle's classification. He wanted to put one question to those people who believed in it. He asked them to take those cases of postnormal occlusion (what Angle called Class II)—there were four possibilities; in any one of those cases, the malocclusion of the teeth might be the result of the whole of the maxilla being too far forward; it might, in the second place, be the result of the maxillary teeth in their sites and sockets in the maxilla being too far forward—that was the second possibility; the third possibility was that the mandible might be, as a whole, too short, and

consequently the whole of the mandibular arch too far back, and the fourth possibility was that the mandible might be normal in size, but the mandibular arch of the teeth might be somewhat too far back in the mandible itself. Now, those four possibilities must be apparent, he thought, to everybody. He wanted the Angle people to investigate 100 cases, and to give the percentage of each possibility in those 100 cases. When that had been done, or when a serious attempt to do that had been made, then the illusions of Angle's classification would become apparent. To do that involved a recourse to anthropometric processes, and until that shall have been done—and it would not be done for some years—he said that Angle's classification was based upon a series of presuppositions. Progress in knowledge was arrived at very largely by a criticism of what our fathers believed to be facts. We found on closer investigation very often that what previous generations believed to be facts were not facts, and that he believed to be what was going to happen in the case of orthodontics.

Mr. Chapman explained that he had very little to say except to congratulate Dr. D'Alise not only on his paper, but also on his being able to deliver it in a tongue which to him was foreign. He was very glad to hear that he pointed out heredity as an etiologic factor, and he thought Dr. D'Alise also had made it clear that it was a more important factor in the causation of those things than any of the other causes he had mentioned. Mr. Chapman was inclined to agree with him—in fact he might say he absolutely did agree with him, especially if he would combine with heredity other contributory factors—though it seemed extremely difficult to differentiate one from the other. As Dr. D'Alise had said, we could all find in our practices, where we had several children in the same family, three or four of those children possessing very similar types of irregularity. He did not himself think they were due to environment after birth; it seemed to him they must be due to environment before birth or to heredity. One other point with reference to the maxillary incisors resting on the lower lip; this seemed to substantiate what he had already said—that one need not wait until a child is very old to see the maxillary incisors resting in the position described, and he had recently seen a baby about fourteen months old with the maxillary incisors resting there. So that he did not think the cause of that position of those incisors could have arisen after the child was born but before, and he thought if these questions were studied from the very earliest period, one or two years of age, one would be getting much nearer the true factors as to the etiology, and when one did that he thought one would be in a better position to treat one's cases, and avoid some of the difficulties which Dr. Lockett mentioned in his paper.

Dr. Levy-Davidsohn said she quite agreed with Mr. Campion as to what he said, because she had proved it by the cases she had seen and those she had treated in her practice. She had at home the models of three cases (she regretted she had not brought them with her) which were very instructive; they looked quite the same at first sight, and when the impressions were taken looked quite the same, and of course would have been treated in the same way, but after the diagnosis of Dr. Simon had been used and the models and photographs had been studied, she found that the three cases were quite different. In the first two cases the maxilla was quite all right, only there was protrusion of the canines and it was the mandible which was wrong; in the third case there was protrusion of the whole maxilla, and it was found that the mandible was quite all right. She was quite sure if she had treated the three cases in the same manner she would have come to no success at all; she would have failed terribly.

Dr. Rojas said he had not had sufficient experience to join in the argument against Angle's classification, but what he believed was that it had always been wrongly interpreted —cases had been diagnosed as Class II when they really belonged to Class I—as Class III when they belonged to Class I, merely because the mandibular teeth were protruding over the maxillary teeth without taking into consideration the distocclusion of the mandible to the maxilla. That was what he had learned in the Angle school of orthodontia lately, and it seemed to him that the arguments against the Angle classification were because it was wrongly interpreted. The Angle classification seemed to him to be very practical for everybody, but it should be studied carefully and understood properly. He congratulated Dr. D'Alise very heartily on his paper on the subject of "Pathogenesis."

Mr. Lockett said that he thought Dr. Rojas' remarks on the paper, particularly with reference to the Angle classification, brought out the point that perhaps a good many of them

did not realize. The gist of his remarks was that it was wrongly interpreted. Well, Dr. Rojas had been fortunate enough to have been with Dr. Angle for a period, and apparently Dr. Angle's views with regard to his own classification were today slightly different from what they had been in the past. He took it that that was what Dr. Rojas meant—that Angle felt there was some reason and good ground for complaint. Personally, he had always used Angle's classification in connection with the treatment of cases, and he thought the majority of men had done so. He did not think they had always admitted that the classification was perfect in every respect, but on account of its simplicity and general line of conduct it seemed to serve the purpose. His feeling, however, about the question of the Angle classification was the point he had brought up in the paper he had read—and he would just emphasize it—that when that classification held the field as the classification most people used, and when as a result of the treatment of cases—whether the Angle classification had anything to do with the failures or no—the general methods of that procedure were adopted in the treatment of Class II cases, there was one feature which resulted, i.e., the relapsing of cases, and this seemed to worry the author and the teachers in America to such an extent that they deliberately—he did not know who was responsible for it, he put it down to Angle yesterday, and if he did so wrongly he was very sorry, but he did not know to whom else to attribute it—made a change of plan converting Plan II into Plan III. It was found, in the treatment of Class II cases, the jumping of the bite, which was Plan II, had not proved a success, and it was then found that the best way of getting over this difficulty was to tip the maxillary first molar backward. By compromising his classification he absolutely knocked the bottom out of it. Whoever brought that plan forward absolutely wrecked it. If Angle did so, he wrecked his own classification. He felt that a great many men who had practiced orthodontia and worked out the terrible problem of Class II cases would find that the majority in England did nothing else than Class II, and looked upon the others as child's play. When he got a simple case of Class I he gave three cheers! The whole trouble of orthodontics today was wrapped up in the case of Class II, Division 1, and subdivisions. He should never waste time in adopting any other classification, although it might be even better than the other, unless it was simple. In a busy practice it was necessary to reduce things to a minimum of simplicity. His whole faith was absolutely wrecked in 1907, two years after Angle brought out his seventh edition. Two years before that he had taken Angle's course and had spent six long weeks, from morning to night, on occlusion, and when he picked up the book in England, after having set out to fight the battle of preaching the gospel of orthodontics, and found the right-about-face of the teaching, he was very much disgusted. He found the only thing to do was to paddle his own canoe. He only wished to state the facts as he found them as far as England was concerned. America and other countries would have to fight their own battles, and it was the duty of everybody to tackle the question. If etiology was going to solve the problems, dental surgeons should get on with it, and whatever came along give it a trial.

Mr. Hughes wished to associate himself with what Mr. Campion had said. He had had the pleasure of working under him for three years, and very much appreciated his conscientiousness and independent work. He maintained that in treating a case one must get down to the rock-bottom fact of diagnosis, and it was impossible to make a correct diagnosis unless the anatomic points were included. Each jaw consisted anatomically of a body and the alveolar process, and it was necessary to know whether the abnormality was entirely limited to the bone or to the alveolar process before it could be treated. In the present state of knowledge he did not think an abnormality could be treated if the body of the bone was affected; he did not say it would be impossible to do so, because he had great faith in the endocrine treatment generally, although knowledge in that direction was very small. With regard to alveolar trouble, all orthodontic work was entirely related to it. He thought Angle's method of treatment was entirely devoted to alveolar treatment, and he had never heard that the body of the bone, the foundation structure, was affected by any treatment that could be carried out. The one objection he had to Angle's classification was that it made no reference at all to the esthetic appearance of the face, and it was entirely in that respect that he considered Mr. Campion's measurements of the utmost benefit and also the vertical lines which had been put forward by Dr. Quintero. He had not heard of the vertical lines

until the previous day, but they filled a gap which existed in Mr. Campion's measurements and were exceedingly useful: he should think that over 60 per cent of the cases where the chin was in a fairly good position with regard to development; but with a very retruded chin, the vertical line, the line drawn from the forehead to the chin, was of very little use from the diagnostic standpoint. He could foresee that the vertical line drawn from the pupil in the Frankfort system was going to be of great assistance in that respect, but he had one objection to Dr. Quintero's recommendation of that line, who was very emphatic that every point from which he drew a line should be fixed. It could be understood that the pupil was not a fixed point, and in that respect he objected to it, but he did not see that it was an obstacle that could not be surmounted. He objected to it because it was not a fixed point.

With regard to treatment, it was the alveolar process that could be treated at present, and until it was known whether the bone or the alveolar process was the chief cause of the abnormality, a proper diagnosis could not be made or proper treatment be given.

Dr. Quintero said it had given him a great deal of pleasure to listen to Professor D'Alise's very interesting paper. He would not go into the question of diagnosis of Class II cases, as that had nothing to do with the paper, and he would not go into the question of horizontal and vertical lines, as the last speaker had done, because from what Mr. Hughes had said it would appear that he had not made himself sufficiently clear on the previous day. Dr. D'Alise's paper was most interesting and thorough, but he had wondered whether it had occurred to some of the members that there was a very close relationship between adenoid vegetations and rickets. Recalling one's general pathology one would remember that rickets constituted a disease which affected not only the bones but all the lymphoid tissue and the marrow of the bones and of the blood corpuscles producing tissues. Adenoid vegetations were nothing more than lymphoid tissue considerably hypertrophied, exactly as hypertrophied tonsils; it was the same tissue exactly. Professor Malfa, of the Paris University, had done some wonderful work in connection with rickets; that work was practically the final word in regard to rickets, and everything that had been added to his work in the last fourteen years had been merely additions in detail. All those who had studied the work had only confirmed what Professor Malfa had said, and nobody had been able to put a point against him in any way. The Professor held the view that the name of rickets should be abandoned and the name of osteolymphaticism should be adopted, because it was a disease of the osseous and lymphatic tissue. There was a close relationship between rickets and adenoid vegetations. The fact was that some authors perhaps went a little too far and considered adenoid vegetations as a symptom of rickets. He thought it might perhaps be considered as something that was left behind by rickets when rickets were cured. If there were rickety conditions of the jaws, which was not infrequent, no trace of rickets in the other bones of the body might be found, simply because those bones could be cured; but the jaw bones could not, on account of the teeth, which maintained the malformation and made it permanent. Dr. D'Alise had noted the particular action of the lower lip on the teeth, and, if he had understood him correctly, said that if the lower lip was not sufficiently strong it would not retain the maxillary teeth, and in that manner there would be protrusion of the maxillary teeth. He was not sure that he agreed with him on that point. Probably in a great many cases the protrusion of the maxillary teeth was due to the elongation of the mandibular teeth, that when the individual bit his food and swallowed there was a forward movement of the mandible which caused the anterior teeth to come into very strong occlusion, and as those anterior teeth were somewhat elongated they struck the maxillary anterior teeth with more force, and little by little, sliding upon the palatal surface of the maxillary teeth, they caused the maxillary teeth to move out more and more until finally the mandibular teeth were striking on the gum. He did not think that point was brought out by the author of the paper. It was one of the important points in the etiology of such malpositions of the maxillary teeth. Those were the only two points on which he was not entirely of the author's opinion. With regard to the opinions expressed by Mr. Campion, he heartily agreed with him. He thought that facial measurments were indispensable for proper treatment and diagnosis. He also thought the measurements, as Mr. Campion took them, could be very well completed by measurements based on the horizontal and vertical planes.

Mr. Cale-Matthews said he did not hear the paper, but it was obvious from the discussion what its trend was. The correct treatment and maintenance of what had been referred to as Class II were obviously difficulty to all practitioners of orthodontics. He did not want to sound a note of heresy, but he felt that the time was not far distant when they would avoid the use of any such arbitrary word as "classification" in orthodontics. Instead of using the word "class" they would use the word "type." In point of fact he thought it would be an infinitely better word to use today. There were types of cases, types of distal occlusion cases, which were fairly constant. Thinking for a moment of the many varieties of distocclusion cases, one would realize that they all conformed to types, and "classification" did not seem to be the word that should be used. Orthodontists were all extremely grateful to Dr. Angle because he had placed them in a position to realize definite deformities; but there was a factor that was often lost sight of, namely that with Dr. Angle's classification there was also a system of treatment, and that system must logically be applied to his classification. Many men were averse from using appliances that were definitely designed for certain things under a definite system, and he thought it would be quite impossible for anyone who had practiced orthodontics for any length of time to examine a case and eliminate entirely from the back of his mind, in the remote recesses of his imagination, something of Angle's classification. It was impossible to dissociate oneself from one's early beginnings and early teachings. In discussions with men of experience, although they might be entirely opposed to Angle's classification, they involuntarily used the words that he had given them and said, "This is a Class II case." The phrase had so grown into men's minds in connection with diagnostic purposes that they could not dissociate themselves from the classification. He joined issue with Mr. Lockett, who had said, both that day and on the previous day, that a Class I case was child's play. He himself knew of no more difficult case to treat and retain than a complicated Class I case. He should put things in the reverse order. If the treatment was correct one would probably retain a case of distocclusion easier than it would be possible to retain a case of occlusion in Class I. He thought the members should be deeply grateful to men like Campion and Quintero and others who were working on the present lines. He would venture to put forward another heresy of thought. When all was said and done, when all the measurements were taken and all the treatment was designed on a scientific basis of wonderful measurements and calculations, mathematical and mechanical, were the results of greater perfection than when they were done on the order of beauty of profile and characteristics of function? How much further had the orthodontist got when he had completed his treatment? He did not wish to be misunderstood. He thought the work was tending to a wonderful result, and in the future would be very helpful, but he maintained that the orthodontist who had the idea of facial beauty, coupled with the best results obtainable in the matter of the function of occlusion, had done the best work he could for his patient in every possible way.

The President said that since he had taken Angle's course, fifteen years ago, he had continually heard arguments about the classification, but until something came up better than Angle's classification he felt bound to stick to it. Angle's name was actually to him on a pinnacle or in an aeroplane, and Angle was ready and willing to absorb any better classification that any person could produce. Until there was a better classification, a simpler or more scientific classification, a great many orthodontists would still continue using Angle's. The discussion, he thought, was paying Angle the greatest compliment. Angle was a man whom every person threw a stone at, but Angle was willing to stand it and was willing to learn. He had changed his definition two or three times and was willing to use the word "type." He was trying to get the best possible from every country and to incorporate it with his own system.

Dr. D'Alise, in reply, said that with regard to the question of classification, he was afraid he could not deal with the matter as his English was not sufficiently extensive. It was too big a question for him to deal with properly. Also he had said in the beginning of his paper that he was not intending to discuss classification. He had just put something forward to serve for study and the question of classification did not come into the discussion at all. In his paper he spoke of etiology and pathogenesis, and he expected that the discussion would follow along that line. Dr. Quintero had raised the question of etiology in some way, as well

as Mr. Chapman. The subject of rickets had not yet been settled. Every tissue and organ of the body, but especially the bones, were subject to rickets, and rickets were very prevalent. Almost 85 per cent of children suffered from rickets, and many of the cases were healed spontaneously and no sign of rickets could be discovered afterwards, and yet in some way the sign of rickets could be found in the teeth. Rickets were due to a lack of lime salt—something was missing in the bone to fix the lime salts. He believed that rickets, adenoids and lymphatics in a general way occurred together. It was a league of many diseases, which could not be properly explained. With regard to the elongation of the mandibular teeth, that occurred as a consequence of the biologic law that everything which failed in its service to the body tended to become extruded. In mouth-breathers the teeth, especially the front teeth, did not function properly, and elongation took place. With regard to Dr. Chapman's remarks on the question of heredity, it was often seen that many children had the same malocclusion as the parent. In some parents he had examined who had Class II, Division 2 malocclusion, some of the children were also affected with Class II, Division 1, and some others with Class II, Division 2. It meant that the pathogenesis of the two divisions was the same. It was a question of heredity, not of habit. Sometimes habit might be the cause of malocclusion, but it was not the principal cause. It was a question that had to be studied if progress was to be made. It was a great pity to see so many people in the street suffering from malocclusion, which was a sign of degeneracy of the human body.

"TIC-DOULOUREUX"*

By Dr. A. F. Sontheimer, Rome, N. Y.

IT GIVES me great pleasure to come here today and join you in a discussion, the object of which is the relief of human suffering.

For many years tic-douloureaux and sphenopalatine neuralgia have robbed many unfortunate individuals of any pleasure whatever in this world, and their existence has been one long life of pain, and paroxysms of physical torture, so great at times as to render them melancholy and depressed, to such a degree as to welcome peaceful death in preference to living torture.

Several patients have told me that the reassurance that the disease was not fatal was the worst news that they had received.

My paper today deals with a new palliative treatment for the relief of this disease, which has proved effective for the last three years in nearly every case, and to my mind has proved by clinical results that the efficacious treatment of this disease lies in a new field of therapeutics, radically different than any employed at the present time.

I will divide tic-douloureaux and sphenopalatine neuralgia into two separate groups, for while I believe both of them to have the same etiology, the technic of injection and the pathologic symptoms are different.

The *origin* of this disease is unknown but from the earliest records available it has always been associated in one way or another with the teeth. Even to this day the promiscuous extraction of teeth is usually resorted to before any true diagnosis is made.

Of the etiology even less is known. Patients often have a history of trauma, but in many cases any such history is often untrue. Due to the fact that this disease therapeutically resembles an ascending neuritis and sciatica, I am of the opinion that the disease is intrinsic and of germ origin.

Histologically the disease resembles neuritis and sciatica and some cases have shown atrophy and degeneration but it has not yet been proved that in every case the microscopic findings have been the same. It is better perhaps to consider this disease clinically as an upset in the electrobiochemic balance of the living cell itself, considering carefully the properties of neurosummation both of the individual neuron and the associated reflex ganglion.

While the very latest written accounts of this disease look for a terminal origin, I believe that clinical evidence has not proved this theory. It is true that temperature and tactile neurons carry impulses fron. the periphery that cause paroxysms of pain, probably through summation or associated

*Read at the meeting of the Seventh District Dental Society of the State of New York, April 6, 1926.

Clinic held June 18, 1926, at Rochester Dental Dispensary.

Committee to report on the results and follow up of the patients: Clifford E. Rose, D.D.S., Buffalo, N. Y.; Elmer W. O'Brien, M.D., Rochester, N. Y.; Fred'k. W Proseus, D.D.S., Rochester, N. Y.

sympathetics but I have proved to my own satisfaction that in many cases a complete block of the peripheral nerves has had no effect on the disease itself, which is intrinsic and seems to occupy the nerve entirely from the ganglion to the periphery.

The symptoms of tic-douloureaux are too well known to mention but I might state that the mandibular division is affected in most of the cases followed by the superior maxillary division.

The first division of the trigeminal nerve affecting the supraorbital region has been spoken of by many authorities. Patrick has abandoned the injection of this branch on account of the nearness to adjoining structures of great delicacy. Several cases of blindness and dementia following the injection of alcohol into this branch, seem to have caused some great specialists including Patrick to abandon this branch entirely.

While several cases that have come into my practice have apparently symptoms of disease of this branch, I have only found it as a sympathetic pain associated with the superior maxillary or mandibular nerves. After clearing up the disease in the second or third division the pain following the course of the first division has disappeared.

In describing the character of the pain Blair states that to the paroxysmal character is later added an irregular periodicity which may be evidenced by the pain being present on alternate days, more frequent or more intense on alternate days, or present for indefinite stretches of time that last for weeks or months alternating with periods of comparative or complete freedom. A very marked regular periodicity especially in a recent case is strong evidence against, but does not absolutely exclude the possibility of its being a true major tic. Such neuralgias are usually of the variety known as sun pains, which seem due to some malarial or climatic influence or sinus infection. In a few cases there has been a continuous dull ache over some part of the nerve, with recurring paroxysms of a sharper character.

When the pain returns it is in the same spot in which it first appeared and although it may radiate the pain is always sharpest in one small certain place.

While usually confined to one side I have known at least three cases to involve the other side, either simultaneously or at another time. I have observed a purely sphenopalatine neuralgia to develop into a major tic in nine months.

Blair describes concisely and clearly the symptoms as follows:

"The trunks and branches of the nerve may or may not be tender but in almost all cases there are spots over the distribution of the nerve, stimulation of which causes a twinge in the pain area. The touch of a finger, a breath of cold air, in some cases heat, in others the taking of foods or liquids in the mouth, or the act of swallowing or a sudden movement or jarring—any or all these may bring on the pain." Blair further states, "It is pitiful to observe the extremes to which sufferers will resort to avoid the stimuli that they know will produce pain. Some of them will talk from, or will take food or drink into only one side of the mouth. One patient would go for days without even swallowing water; others will not enter a room until

they are sure all windows are closed. Some for months at a time will not wash one side of the face or brush the teeth. In older cases, though there is evidence of extreme pain during the attack, the patient seems to have become accustomed to it and seldom makes an outcry or demonstrative complaint."

The duration of the disease is one of the strongest points in the diagnosis. It is the recent cases that require the most careful differentiation. Pain due to pulpitis, malaria, malignant growths or sinusitis, will if observed long enough show some change or characteristic that will differentiate it from true tic, or the general health or condition of the patient will give some clue to the cause.

In considering the symptoms of sphenopalatine neuralgia, *Sluder* gives a clear and concise description of the syndrome, therefore I will quote him as follows:

"When seen from the beginning the pains of postethmoidal or sphenoidal diseases have usually preceded the development of the characteristic neuralgia picture." I have also remarked that after the neuralgic manifestations have continued for some time (approximately four weeks) they begin to run irregularly, assuming the form of migraine which may persist for years after all local inflammatory conditions have disappeared.

One of the most striking manifestations of disturbance in the sphenopalatine ganglion is the wide and characteristic distribution of pain along definite lines. These neuralgic manifestations can be evoked by mechanical irritation of the ganglion by the Faradic current and by therapeutic injections of alcohol. The more recent palliative treatment which I am about to describe has proved efficacious in every case during the last three years.

The neuralgia is described as a pain at the root of the nose, and sometimes in or about the eye, taking in the maxilla and teeth and extending beneath the zygoma to the ear to take on the form of earache. It is emphasized at the mastoid but nearly always severest at a point about two inches posterior to the mastoid, thence reaching backward by way of the occiput and neck and it may extend to the shoulder blade and shoulder and in severe attacks to the axilla, arm, forearm, hand and fingers. Sometimes the patient complains also of a "stiff" or aching throat without inflammation, of pain or oftener of itching in the roof of the mouth, or of pain inside the nose.

Along with the pain there is also, on the affected side, slight anesthesia of the soft palate and of the pharynx as far down as the lower part of the tonsil and also in the anterior part of the nose.

In a large percentage of cases the neuralgia is accompanied by motor disturbance affecting the configuration of the soft palate. The palatine arch on the affected side is often higher than on the other side and during movement the median raphe is deflected from the affected side. Taste is usually less acute on the dorsum of the tongue of the affected side.

The rationale of the treatment while very successful clinically is very difficult to state as a matter of fact. We must theorize from clinical observation of the injection of which there are two great classes of drugs used.

The first and possibly the older is the palliative drugs first used in 1869 and later the escharotic drugs of which alcohol seemed the most popular.

A brief history at this time might be of interest concerning the different things used for injection.

Otto Weiner states that in about 1840 Rund used morphine and creosote and in 1857 Wood injected morphine only, while Bell used atropine. From this time on practically everything has been tried in the pharmacopeia with various results, even air and mechanical irritation of the ganglion.

The credit goes to Potain who in 1869 ascribed benefit to large injections of water and as far as I know it is the first palliative treatment for this disease ever described. Later aqueous solutions of cocaine became popular. Schleich used very dilute cocaine solutions. Bock used tropacocaine and Kurzwelly used betaeucain. In 1904 Lang made intraneutral injections of physiologic saline solution and betaeucain—1:1000. Otto Weiner made an epoch-making discovery that sciatica responded to a slight modification of the above solution. He added a small amount of calcium chloride.

Last year a paper was read before the Philadelphia Psychiatric Society and an account fully described in the New York Times stated, which to my mind seems a logical truth, that clinically an injection of isotonic aqueous solution of sodium potassium chloride, calcium chloride and magnesium sulphate into the cerebrospinal fluid had proved successful in a great many cases of certain forms of neuropathology. I have lost the account and do not remember the author of that paper but I wish him continued success in this field and I believe he has accomplished a decided advance in the study of neuropathology. My faith in his work is in the knowledge that this solution, while palliative, has a decided effect on the nervous tissue. I had used practically the same solution minus the magnesium sulphate as my "B" solution in the treatment of tic-douloureux for two years previous.

In considering certain alkaloids and ptomaines which have a marked effect on the nervous tissue a little consideration of the physiologic chemistry of certain groups and radicals is necessary.

Beginning with cocaine, which is the methyl ester of benzoyl ecgonine, formula $C_{17}H_{21}NO_4$, we also have hyosine and scopolamin with the same chemical formula derived from different nonvolatile alkaloids: hyoscine derived from henbane, scopolamine from scopola carniolica, cocaine from erythroxylon coca.

Among the nonoxygenated liquid ptomaines may be enumerated diethylamine, triethylamine, propylamine. These are monamines.

The introduction of an alcohol or basic radical into the ammonia molecule, replacing one or more hydrogen atoms, gives us an *amine* and just as ammonia can combine with a haloid and to form an ammonium salt, so the amine or derived ammonia can unite with the chloride, bromide or iodide of an alcohol radical to form a derived ammonium salt in which for instance the four hydrogen atoms of NH_4CL may be replaced by alcohol radicals.

We may have primary, secondary or tertiary amines according as one, two or three atoms of hydrogen in NH_3 are replaced. We may also have

monamines, diamines or triamines, according as one, two or three molecules of ammonia are represented. Thus NH_2CH_3, methylamine, is a primary amine. $NH\text{-}(CH^3)_2$, dimethylamine, is a secondary amine.

The amines containing the lower alcohol radicals bear a close resemblance to ammonia.

The ammonia bases are solid, very hygroscopic and exceedingly like potash in properties.

When the paraamido radical is combined with benzoyldiethylamino ethanol or (butylamino propanol) we have a local anesthetic action similar to the methyl ester of benzoyl ecgonine.

The hydrochloride of paraamidobenzoyldiethylaminoethanol is soluble in its own volume of water or in any other dilution.

The sulphate of paraaminobenzoyl gamma di-n butylamino propanol is nearly as soluble as the former but the hydrochloride or chloride precipitate of paraaminobenzoyl gamma di-n butylamino propanol is insoluble in water or body fluids.

This insolubility probably is the reason for the long lasting effects of the palliative treatment which I am about to describe, but whether this drug enters into the biologic chemistry of the protoplasm or whether it merely acts as a hygroscopic agent furnishing water to the cell by osmosis from the tissue fluids, I am unable at this time to state.

The greatest mystery I believe to be solved in the world today is a knowledge of the living protoplasm. A thorough knowledge of the electrobiochemic properties of living protoplasm probably will never be understood but we have progressed clinically by empiric methods and by the studies of Koch and Ehrlich to such a degree that the results have been most gratifying. Perhaps it will not be necessary to thoroughly understand the electrobiochemic properties of living protoplasm if we continue to learn by empiricism and clinical findings.

Before considering an injection into the cranial fossa, a thorough knowledge of the anatomic structures must be considered and studied in different angular relationship.

The trigeminal nerve is the largest cranial nerve and is the great sensory nerve of the head and face and the motor nerve of the muscles of mastication.

It emerges from the side of the pons near its upper border by a small motor and large sensory root—the former being situated in front and medial to the latter.

Motor Root.—The fibers of the motor root come from two nuclei, a superior and an inferior. The superior nucleus consists of a strand of cells occupying the whole length of the lateral portion of the gray substance of the cerebral aqueduct. The inferior or chief nucleus is situated in the upper part of the pons, close to its dorsal surface and along the line of the lateral margin of the Rhomboid fossa. The fibers from the superior nucleus constitute the mesencephalic root; they descend through the midbrain and entering the pons join with the fibers from the lower nucleus and the motor root thus

formed, pass forward through the pons to its point of emergence. It is uncertain whether the mesencephalic root is motor or sensory.

Sensory Root.—The fibers of the sensory root arise from the cells of the semilunar ganglion which lies in a cavity of the dura mater near the apex of the petrous portion of the temporal bone. They pass backward below the superior petrosal sinus and tentorium cerebelli and, entering the pons, divide into upper and lower roots. The upper root ends partly in a nucleus which is situated in the pons lateral to the lower motor nucleus and partly in the locus caeruleus; the lower root descends through the pons and medulla and ends in the upper part of the substantia gelatinosa of Rolando. This lower root is sometimes named the spinal root of the nerve. Medullation of the fibers of the sensory root begins about the fifth month of fetal life, but the whole of its fibers are not medullated until the third month after birth.

The semilunar ganglion is best described anatomically by Gray and I will quote him as follows:

"The *semilunar or gasserian ganglion* occupies a cavity in the dura mater covering the trigeminal impression near the apex of the petrous portion of the temporal bone. It is somewhat crescentic in shape with its convexity directed forward medially; it is in relation with the internal carotid artery and the posterior part of the cavernous sinus. The motor root runs in front of and medial to the sensory root and passes beneath the ganglion; it leaves the skull through the foramen ovale and immediately below this foramen joins the mandibular nerve. The great superficial petrosal nerve lies also underneath the ganglion.

"The ganglion receives, on its medial side, filaments from the carotid plexus of the sympathetic. It gives off minute branches to the tentorium cerebelli and to the dura mater in the middle fossa of the cranium. From its convex border, which is directed forward and lateralward, three large nerves proceed, viz., the ophthalmic and maxillary and mandibular.

"The ophthalmic and maxillary consist of sensory fibers exclusively; the mandibular is joined outside the cranium by the motor root.

"Associated with the three divisions of the fifth nerve are four small ganglia. The ciliary ganglion is connected with the ophthalmic nerve; the sphenopalatine ganglion with the maxillary nerve; and the otic and submaxillary ganglia with the mandibular nerve. All four receive sensory filaments from the trigeminal and motor and sympathetic filaments from various sources; these filaments are called the roots of the ganglia."

The ophthalmic nerve or first division of the trigeminal is a sensory nerve. It supplies branches to the cornea, cilium body and iris; to the lacrimal gland and conjunctiva; to the part of the mucous membrane of the nasal cavity; and to the skin of the eyelids, eyebrow, forehead and nose. It is the smallest of the three divisions of the trigeminal and from the upper part of the semilunar ganglion as a short flattened band about 2.5 mm. long which passes forward along the lateral wall of the cavernous sinus, below the oculomotor and troclear nerves; just before entering the orbit, through the sphenoidal fissure, it divides into three branches, lacrimal, frontal and nasociliary.

The ophthalmic nerve is joined by filaments from the cavernous plexus

of the sympathetic, and communicates with the oculomotor, troclear and abducent nerves; it gives off a recurrent filament which passes between the layers of the tentorum.

The maxillary nerve, or second division of the trigeminal, is a sensory nerve. It is intermediate, both in position and size, between the ophthalmic and the mandibular. It begins at the middle of the semilunar ganglion as a flattened plexiform band and, passing horizontally forward, it leaves the skull through the foramen rotundum, where it becomes more cylindrical in form and firmer in texture. It then crosses the pterygopalatine fossa, inclines lateralward on the back of the maxilla and enters the orbit through the inferior orbital foramen. It is then called the infraorbital nerve and, passing horizontally forward, it leaves the skull through the infraorbital foramen.

The branches given off are as follows: In the cranium, the middle meningeal; in the pterygopalatine fossa, the zygomatic, sphenopalatine and post-superior alveolar; in the infroarbital canal, the anterior and the middle superior alveolar; on the face, the inferior palpebral and external nasal and superior labial.

The sphenopalatine ganglion, the largest of the sympathetic ganglia associated with the fifth nerve, is deeply placed in the pterygopalatine fossa, close to the sphenopalatine foramen. It is triangular or heart shaped, of a reddish gray color, and is situated just below the maxillary nerve as it crosses the fossa. It receives a sensory, a motor and a sympathetic root.

Its sensory root is derived from two sphenopalatine branches of the maxillary nerve; their fibers for the most part pass directly into the palatine nerves; a few, however, enter the ganglion, constituting its sensory roots. Its motor root is probably derived from the nervous intermedium through the great superior petrosal nerve and is supposed to consist in part of sympathetic efferent fibers from the medulla. In the sphenopalatine ganglion they form synapses with neurons whose postganglionic axons, vasodilator and secretory fibers are distributed with the deep branches of the trigeminal to the mucous membrane of the nose, soft palate, tonsils, uvula, roof of the mouth, upper lip and gums, and to the upper part of the pharynx.

Its *sympathetic root* is derived from the carotid plexus through the deep petrosal nerve. These two nerves join to form the nerve of the pterygoid canal before their entrance into the ganglion.

The *great superficial petrosal* nerve is given off from the genicular ganglion of the facial nerve; it passes through the hiatus of the facial canal, enters the cranial cavity and runs forward beneath the dura mater in a groove on the anterior surface of the petrous portion of the temporal bone. It then enters the cartilaginous substance which fills the foramen lacerum and joining with the deep petrosal branch, forms the nerve of the pterygoid canal.

The *deep petrosal* nerve is given off from the carotid plexus and runs through the carotid canal lateral to the internal carotid artery. It then enters the cartilaginous substance which fills the foramen lacerum and joins with the greater superficial petrosal nerve to form the nerve of the pterygoid canal.

The *mandibular nerve* or third division of the trigeminal supplies the teeth and gums of the mandible, the skin of the temporal region, the auricula, the lower lip, the lower part of the face and the muscles of mastication; it also supplies the mucous membrane of the anterior two-thirds of the tongue. It is the largest of the three divisions of the fifth nerve and is made up of two roots, a large sensory and a small motor, which unite with the trunk of the sensory just after its exit from the foramen ovale.

Immediately beneath the base of the skull the nerve gives off from its medial side a recurrent branch (nervous spinosis) and the nerve to the pterygoidens internus and then divides into two branches.

The anatomy at this point is of the utmost importance as all untoward sequelae are the result of a lack of knowledge of these structures.

The nervous spinosus enters the skull through the foramen spinosum with the middle meningeal artery. It divides into two branches anterior and posterior and supplies the dura mater; the posterior branch also supplies the mucous lining of the mastoid cells; the anterior communicates with the meningeal branch of the maxillary nerve.

The long buccinator is very often involved in tic-douloureux and individually it is next to impossible to locate but when injected through its common trunk, viz., the third division, it can readily be taken care of. It emerges from under the anterior border of masseter, ramifies on the surface of the buccinator and unites with the buccal branches of the facial nerve. It supplies a branch to the pterygoidens externus during passage through that muscle. The buccinator nerve supplies the skin over the buccinator and the mucus lining its surface.

The *lingual nerve* is another branch often involved in tic-douloureux. It supplies the mucous membrane of the anterior two-thirds of the tongue. It lies at first beneath the pterygoidens externus, medial to and in front of the inferior alveolar nerve and is occasionally joined to this nerve by a branch which may cross the internal maxillary artery.

The chorda tympany also joins it at an acute angle in this situation. The nerve then passes between the pterygoidens internus and the ramus of the mandible and crosses obliquely to the side of the tongue over the constrictor pharyngis superior and styloglossus, and then between the hyloglossus and deep part of the submaxillary gland. It finally runs across the duct of the submaxillary gland and along the tongue to its tip.

Its branches of communication are with the facial through the chorda tympani, the inferior alveolar and hypoglossal nerves, and the submaxillary ganglion.

The branches of the submaxillary ganglion are two or three in number. Those connected with the hypoglossal nerve form a plexus at the anterior margin of the hyoglossus.

The inferior alveolar nerve is the largest branch of the mandibular nerve. It descends with the inferior alveolar artery, at first beneath the pterygoidens externus and then between the sphenomandibular ligament and the ramus of the mandible to the mandibular foramen. It then passes forward in the man-

dibular canal beneath the teeth as far as the mental foramen where it divides into the incisal and mental branches. It gives off branches to the mylohyoid, teeth, incisive and mental region.

Two small ganglia, the otic and submaxillary are connected with the mandibular nerve.

The otic is most important from our viewpoint and it may be injured in injecting through the foramen ovale. It is a small, oval-shaped, flattened ganglion of reddish gray color, situated immediately below the foramen ovale. It lies on the medial surface of the mandibular nerve and surrounds the origin of the nerve to the pterygoidens internus. It is in relation laterally with the trunk of the mandibular nerve at the point where the motor and sensory roots join; medially with the cartilaginous part of the auditory tube and the origin of the tensor veli palatine; posteriorly with the middle meningeal artery. It is connected by two or three short filaments with the nerve to the pterygoidens internus from which it may obtain a motor and possibly a sensory root. It communicates with the glossopharyngeal and facial nerves through the lesser petrosal nerve continued from the tympanic plexus and through this nerve it probably receives a root from the glossopharyngeal and motor root from the facial; its sympathetic root consists of a filament from the plexus surrounding the middle meningeal artery. The fibers from the glossopharyngeal which pass to the otic ganglion in the small superficial petrosal are supposed to be sympathetic efferent or preganglionic fibers from the dorsal nucleus or inferior salivatory nucleus of the medulla.

Postganglionic fibers from the otic ganglion, with which these form synapses, are supposed to pass to the parotid gland.

A slender filament (sphenoidal) ascends from it to the nerve of the pterygoid canal and a small branch connects it with the chordea tympani.

Pains referred to various branches of the trigeminal nerve are of very frequent occurrence and should always lead to a careful examination in order to discover a local cause. As a general rule the diffusion of pain over the various branches of the nerve is at first confined to one only of the main divisions and the search for the causative lesion should always commence with a thorough examination of all those parts which are supplied by that division; although in severe cases, pain may radiate over the branches of the other main divisions. The commonest example of this condition is the neuralgia which is so often associated with dental caries; although the tooth itself may not appear to be painful, the most distressing referred pains may be experienced and these are at once relieved by treatment directed to the affected tooth.

Many other examples of trigeminal reflexes could be quoted but it will be sufficient to mention the more common ones. Dealing with the ophthalmic nerve, severe supraorbital pain is commonly associated with acute glaucoma or with disease of the frontal or ethmoidal air cells. Malignant growths or empyema of the maxillary antrum, or unhealthy conditions about the inferior conchae or septum of the nose, are often found, giving rise to second division neuralgia, and should always be looked for in the absence of dental disease. It is on the mandibular nerve, however, that some of the most striking re-

flexes are seen. It is quite common to meet with patients who complain of pain in the ear in whom there is no sign of aural disease and the cause is to be found in a carious tooth of the mandible. Moreover, with an ulcer or canker of the tongue, often the first pain to be experienced is one which radiates to the ear and temporal fossa, over the distribution of the auriculotemporal nerve.

I hope that the lengthy anatomic considerations of the structures involved have not taken up too much time but the entire success of the treatments depends upon a thorough knowledge of the parts involved and the avoidance of untoward sequelae following treatment depends entirely on the operator's knowledge of the cranial anatomy.

The fifth nerve becomes completely medullated three months after birth and starts at the fifth month of fetal life. Medullation, as you know, means the axis cylinder is surrounded by the sheath of Schwam or myelin. The bundles are encapsulated in a tough connective tissue sheath, the epineurium. Success of either the palliative treatment or the corrosive injection depends upon puncturing this sheath and using a comparatively small amount of fluid.

The rationale of the palliative treatment, which is original and which has given me continued success for the past three years, requires a finer technic than the use of alcohol or other corrosive fluids. While almost painless and nearly free from danger, success depends entirely on an extremely delicate technic.

The foramen ovale is entered (at the anterior border) and the epineurium punctured and 1 c.c. of "A" solution injected. The needle is withdrawn and is followed by the "B" solution immediately, using 3 c.c.

The "A" solution is a 2 per cent solution in distilled water of butyn or the paraaminobenzoyl-gamma-di-n-butylamino-propanal sulphate. This is followed by the "B" solution, which is made up as follows:

Water	1000.00
Calcium chloride	1.00
Sodium chloride	6.00
Magnesium sulphate	0.75

Perhaps the best of the corrosive liquids is Patrick's solution, viz.:

Novocaine	2 per cent
Chloroform	5 per cent
Alcohol	70 per cent
Water	23 per cent

The procedure of the palliative treatment which I have been using for the past three years, and which has given results in 90 per cent of the cases lasting three years plus (the shortest effect I have on record lasted eight months), is as follows:

Two sterile test tubes containing the "A" and "B" solutions separately are brought to a boil and kept at boiling temperature for twenty minutes on three successive days before the operation. This assures complete sterility, which is important considering the susceptibility of the meninges to infection.

The patient is seated in a dental chair at mouth level to the operator's shoulder. The mucous membrane under the zygoma is painted with an 8 per cent tincture of iodine back to the anterior pillar of the fauces. It is immediately dried with a warm air syringe while an assistant holds the cheek away with a retractor. The patient thrusts the jaw to the side being operated upon, dropping the opposite condyle. This gives room for the operator to work.

A perfectly straight steel needle 2½″ long, with a safety disc, is used on a light weight glass syringe. The needle is 25 gauge and must be sharp. Dull needles cannot be used as they will not puncture the epineureum but will cause considerable pain and thrust aside the nerve trunk.

Being parallel with the inferior border of the mandible the needle is inserted as high as possible, just posterior to the tuberosity.

It is necessary to pierce the substance of the internal pterygoid muscle and a feeling like a rubber resistance is conveyed to the syringe; the needle is pointed slightly medially and continued up until the internal pterygoid fossa is struck. Very little areolar tissue will be met with and as soon as the bone is struck carry the point of the needle downward, feeling with short jabs until the anterior border of the foramen ovale is reached. Now a twinge will be felt by the patient and a few drops of "A" solution are deposited. Wait a few seconds and then firmly push the needle 5 mm. further, emptying the rest of the 1 c.c. of "A" solution.

The "B" solution is injected in the same way; only 3 c.c. are used.

It is best in using the palliative treatment to follow it up once or twice at intervals of one week apart.

In old persons having osteoporosis it is possible to inject into the wrong place unless painstaking care is used to get the necessary twinge.

The untoward sequelae following the palliative treatment are small. If infection is guarded against nothing but a passing trauma need be experienced; however, the possibilities of untoward sequelae following an escharotic fluid are great and may be summed up as follows:

1. Injection into the internal carotid artery happened in Germany, causing instant death.

2. Injection into the eustachian tube caused intense agony and permanent loss of hearing on the affected side.

3. Injection of the foramen spinosum caused cerebral shock and convulsions.

4. Paralysis of the seventh and eighth nerves by using too much alcohol which followed the course of the great superficial petrosal nerve to the aqueductus fallopii.

5. Terrific shock, convulsions and complete motor paralysis of the opposite side of the body caused by too much alcohol or opening an artery communicating to the substantia gelatinosa of Rolando.

6. Violent dementia due to circulatory communication with the cells of Purkinje in the cortex.

INJECTION OF THE SPHENOPALATINE GANGLION

The needle used for this injection is slightly shorter than for the gasserian ganglion but otherwise has the same gauge and safety disc.

A slightly obtuse right angle to the barrel of the syringe gives about the proper form for convenience of injection.

The preliminary preparation of the mouth is the same as for the injection of the gasserian. The needle is inserted close behind the maxillary tuberosity, usually just above the roots at the point above the second and third molar. Bone should be felt and followed for 1½ inches to insure the entrance of the needle into the pterygopalatine fossa and mesially to the petrygoid plate of the sphenoid. At this point the needle is slightly withdrawn and tipped distally until the mesial surface of the pterygoid plate is felt. This gives the landmarks of the fossa mesially and distally and when by the sense of touch the approximate center is found the ganglion can be reached by a 10 mm. thrust.

The danger of using an escharotic fluid at this point lies chiefly in the nearness to the optic nerve, which lies about 15 mm. above.

I have never found occasion to use alcohol or like preparations for this ganglion. The palliative treatment has given a permanent relief in every case without exception for the past three years.

I must say, however, that the technic of injection for the palliative treatment is more exact than that for alcohol as far as results are concerned. Unless a puncture of the epineurium is secured the results will not be lasting. While a bathing of the ganglion or nerve trunks with alcohol will give immediate results, and a 5 or 10 mm. proximity often reaches the nerve, the palliative treatment will not give results unless a direct hit is made.

The customary procedure for injection of the foramen ovale is to inject from the outside cheek 5 or 10 mm. below the middle of the zygoma and half way between the posterior border of the condyle of the jaw and the angle formed by the temporal and zygomatic border of the malar bone.

The needle penetrates to a depth of 40 to 50 mm. and then comes in contact with the external plate of the pterygoid process. This depth varies in proportion to the width of the skull and the prominence of the cheek bones. When the bone is felt the point of the needle is worked upward repeatedly, withdrawing slightly and then reinserting it, the point each time coming in contact with the bony plate until the under surface of the great wing of the sphenoid is felt. This surface is rather perpendicular to the pterygoid process and the needle is felt to slide obliquely along the bone. In this way the sulcus between the pterygoid process and the under side of the sphenoid wing is located.

When this sulcus is recognized the point of the needle is, by the same process of withdrawing and reinserting, made to step backward until it is felt to slip off into space at the posterior border of the process, when it will be right at the foramen ovale, which gives exit to the whole of the third division of the fifth nerve.

In working the point of the needle backwards, it is kept more in contact with the under surface of the sphenoid wing than with the external plate of the process. The sulcus between these two is rounded and the needle must work along the upper part of the groove. Otherwise, when the posterior border of the process is reached, the point will be below the foramen ovale and a backward projection of the external pterygoid plate might separate it from the nerve.

When from the feel of the needle or the sensation of the patient it is thought that the needle is in contact with the nerve, the fluid is liberated a few drops at a time, the point of the needle being shifted slightly until an anesthesia and a paresthesia proclaim success of the operation.

Blair advises 4 c.c. of alcohol mixture be used but to me this seems just four times too much. Such a quantity injected accidentally into the internal carotid or with a skull having osteoporosis, into the meninges, probably would cause instant death. The shock following the injection of such an amount of alcohol might also cause death.

Terrific pain and shock are to be considered and, due to the capillary attraction of alcohol in the tissues, it is apt to extend to delicate areas, producing untoward sequelae (to put it mildly).

Due to the fact that the foramen ovale extends latterly and the nerve trunk is flattened in the same direction, a direct hit and puncture of the perineurium is easier to make intraorally. One is more apt, however, to be successfully guided by the external zygomatic injection on account of the accurate landmarks to follow than by the intraoral injection which must be guided mainly by a long study of various skulls.

Blair uses a thick, heavy gauge needle rather blunt.

I use a fine, 25-gauge needle with a rather sharp point.

The needle must penetrate the substance of the pterygoid muscle and puncture the perineurium and this can be done almost painlessly by a sharp fine needle in contrast to a blunt heavy one.

Success at this work requires long hard study and experience, for sometimes it is necessary to try several times before success is attained. But I believe, if we can give a patient treatment practically without pain and obtain results of long duration by the palliative treatment, it is far better than using alcohol, which is accompanied by excruciating pain and always the risk of accident. The cases I have on record show sphenopalliative neuralgia 100 per cent successful; time, three years plus.

Major tic-douloureux—time: shortest, eight months; longest, three years *plus*. Results obtained in every case without exception.

REPORTS OF PATIENTS

CASE 1.—June 17, 1926. C. W. Y., male, American, aged 58 years, married, children. There are no teeth on the maxilla. Radiograms were taken which showed no trouble. Dr. Welcher cut the gum and scraped the jaw bone twice, but this did not help. Patient went to Dr. G. Kirby Collier, who diagnosed it as Tic-Douloureux. He said poison formed in lower bowel. Patient took cathartics and found that when bowels were kept open the pain was not nearly so severe. At times he could not eat, drink or talk, the pain was so severe. Dr. Collier diagnosed it by touching face with steel instrument, the patient felt every touch.

Patient has two, three and four bowel movements a day. After first treatment by Dr. Collier, patient was free from pain for six months. When pain first started three years ago, he felt it first when shaving. Patient takes 1 teaspoon Kerns Tea every night, steeping it in water. The past four months, while taking this, has had pain only a little. Before this at times he was miserable—the longest the pain ever lasted was forty minutes. This tea is to keep the bowels open.

It seems to be in the first and second division. Sometimes it would disappear by swallowing. The pain is always on the right side, at times it feels like fire. Now, while he is talking, the pain comes and goes, but is not severe. Dr. Collier did not advise operation. When pain would be severe, Dr. Collier would give him pills, advise him to take salts and get the intestinal tract open. Patient would then feel some better.

Patient had injection at Dispensary at Clinic June 18, 1926.

June 24, 1926. Patient felt no effects after the treatment otherwise than a sore gum and a swollen cheek for about 48 hours. The pains have been the same with the exception of the pain near the ear—that seems to be better. Have felt no other effects of the treatment.

July 1, 1926. Patient went to Rome, N. Y., Sunday, June 27 and had treatment (injection) by Dr. Sontheimer—has had no pain of any kind since, had no pain from treatment. Patient is freer from pain than he has been for three years. After the first treatment at the Dispensary patient had some pain all the while but since second treatment there has been no pain of any kind. There is some swelling on the right side. Dr. Sontheimer gave patient four injections—there was immediate relief after this. He said he would probably have to come for another treatment. When the injection was made, Dr. Sontheimer said patient might have some severe pains within a couple of hours after the treatment and advised him to consult a physician and take an aspirin tablet. This was not necessary as there was no pain. There has been numbness since injection but feeling seems to be coming back.

July 28, 1926. There has been a soreness and a decisive swelling up to July 24. At present it is considerably down—the soreness has left and patient has had no pains of any kind since the injection. The swelling interferes somewhat with eating. Patient can now wash face and shave. There is a numbness at the end of the nose, the upper right lip and right side of the face under the eye. Once in a while there is a little burning sensation, but no pain. At Rome, N. Y. patient had four injections, one right after the other, all within about half an hour. It took a little longer between the second and third. First two—first and second again.

August 12, 1926. Patient has had no pains since treatment. Occasionally he has a burning sensation over the parts which are still numb. The numbness has not disappeared since the treatment. Patient feels fine.

December 31, 1926. C. W. Y., was in the office today and reported the following: From June 27, the day of the treatment, until December 25, 1926 when there was a slight twitch on the right side of the face, similar to those he was having previous to the treatment, but not so severe. He has had the same twitch now and then. It comes mostly when he draws a towel over the face in wiping it or when taking something cold. The tic usually comes directly over the right eye, in the supraorbital area.

Between Dec. 31 and next report Feb. 14, 1927 patient had bad attack of la grippe. February 14, 1927, he was in the office and reported that the pain was better, and that he was feeling good again, only when using a towel in wiping the face the pressure will bring on a quick pain but this does not last. This is the only time patient has any pain of any kind.

Case 2.—J. M., June 18, 1926, widower, aged 82 years. Pain started about four years ago. All teeth were extracted at the time pain started. Went to three doctors at Caledonia. They did not discover what was wrong. He was then taken to Dr. Conner of Rochester. He ordered an x-ray taken by Dr. Palmer. Dr. Palmer then diagnosed it as tic-douloureux. He had Dr. Roy Bryant inject alcohol three times* at intervals of a year or more apart. This stopped the pain entirely for a while. After alcohol is injected there is severe pain for a while (a couple of days). The pain is in the lower right. Gum has not healed since last

*This was injected at the mental foramin.

injection. At times he cannot talk with the pain. He can always tell when there is a change of the weather, the pain being worse. It is over a year since last injection. Pain is as bad in the night as in the day, sometimes it is so bad that it wakes him up with a start. Has had pain again since January but has not been as bad since alcohol was at first injected. Patient had injection at Dispensary at Clinic June 18, 1926.

On June 21, 1926, patient wrote the following: "Dr. F. W. Proseus, Dear Sir: In regard to treatment June 18, will say I have felt very good—no pain to speak of. Gums are very sore and feel dizzy at times. Cheek swollen, but I certainly feel much relieved. Very truly, J. M."

On August 24, 1926, J. M.'s son called at office and gave report: A little over a week after patient had injection at Dispensary (June 18) patient went to Rome and had two injections. Dr. Sontheimer said patient would probably have severe pain four hours after injection, but he did not. Two or three days afterward, he would have a shooting pain once in a while and be bothered with a growling pain all the while. The gums have been very sore and patient did not feel as well since second injection, as he did after first. Patient is to go to Rome Sunday, August 29. Will report a week or so after this.

On October 14, 1926, J. M.'s son called at office and gave following report: Patient went to Rome on August 29, and had two injections, possibly three. That night there was a blackness under the eye, sort of black and blue, which lasted for about three days. Patient had some pain for three or four days but not as bad as after second visit to Rome. Finally pain cleared up and he has not suffered any pain for three weeks. Patient feels fine.

March 8, 1927. During November and December J. M. had constant pain—at times it was quite severe. His gums have been sore right along. They wrote Dr. Sontheimer in January—he said he thought he might need another treatment but two or three weeks ago the pain stopped and he has been free from pain ever since. The only trouble he has now is that the gums are sore, the same as they have been right along. He is feeling good.

CASE 3.—Mrs. O. H. F. consulted Dr. Proseus regarding having tic-douloureux May 1, 1926. He referred her to Dr. Flynn who took a radiogram of sinuses and reported clear. Advised her to see Dr. Sontheimer, when a clinic was arranged here in Rochester. Advised her to come and have radiograms taken. The x-ray examination showed accessory sinuses, frontals clear. Ethmoids clear. Maxillary sinuses clear. No difference in density between right and left. Sphenoids clear. Impression—from an x-ray standpoint—all sinuses clear.

Pain started about two and a half years ago. Does not have it when sleeping but as soon as she begins to move around, it starts. The more tired the patient is, the worse the pain is—also any little excitement makes it worse. Teeth on right side were extracted before pain started excepting canine, U. R. This was extracted about two months after patient felt a crawling sensation below the eye. An x-ray was taken but showed no trouble where tooth had been. Patient is troubled with constipation and takes salts regularly, that is, once a week. Patient has had trouble with right side of nose and piece of bone was removed by Dr. Hoyt two years ago just before the trouble started. Patient also went to Dr. Honis.

Patient had injection at Dispensary at Clinic June 18, 1926.

On June 28, 1926 she wrote as follows:

"Dear Dr. Proseus: I waited until after the second injection before writing you. We went to Rome yesterday for that. I still have quite a bit of pain in my face but not as much as after the first injection. It does not come along quite as fast as I had hoped but I think Dr. Sontheimer sincere and means to do the fair thing, so I am going to give him a fair trial. I go to Rome July 10 for a third injection and he hopes that will be the last. My tongue and lips are quite numb since the injection yesterday and quite a burning sensation but the pain is not quite as severe."

On July 30 patient called at office and gave following report: After the injection at the Dispensary patient suffered severe pain for a week in the upper right part of the face. Then went to Rome and had injection in mandible. Had severe pain all the way home. Pain gradually left. Face swelled terribly after second visit. Then waited two weeks and went again to Rome and had injection in right maxilla under eye. Dr. Sontheimer expected that face would swell but patient kept ice bag on it all the way home and it did not swell.

Patient had practically no pain—only the same pain she always has. Dr. Sontheimer said he had done all he could do. He said if patient wanted to have operation to go either to Philadelphia or Boston. Cold air does not affect the pain. Patient has had catarrh since she was a little child. Dr. Sontheimer said case was a little different than other cases he has had, as patient has pain constantly but it is not as severe as many others. It is very tiring and wearing.

PERSONAL COMMUNICATION

My dear Dr. Proseus:

After seeing you with Dr. Sontheimer in Rochester, I came home quite elated over this new solution. I had some solution made up, according to Dr. Sontheimer's formula, and used it on two cases. The first case I used it on was one which I had injected two years age with alcohol, but at the foramen ovale.

However, I decided to use the Sontheimer solution at the foramen ovale. He gave the patient some anodyne after the injection, and told her she would probably have some pain for a few days. The patient returned in a few days and would not let us use the Sontheimer solution again, as she had had so much relief from the other alcohol injection. The result was that we injected with alcohol.

The second case was Dr. McCoy from Smethport, Pa., and who could only stay in the City two or three days. We tried the Sontheimer solution with him but the patient was unable to get any relief, and as his stay was so short, we just injected with the alcohol, to make him comfortable.

After reading the results which you sent me, I have come to the conclusion that we should not expect relief as soon as I had thought we might, and a more careful understanding of the Sontheimer procedure, would, I'm sure, bring more gratifying results. I believe that I will take a trip down to Rome in the near future when it might be convenient for Dr. Sontheimer to have me, and watch him do a few cases in his own clinic. I am not as yet satisfied to believe this solution will take the place of alcohol.

If you are in a position to give me further reports on these cases you have, I would be very glad to receive them, and would be very glad to cooperate with you in any way.

Sincerely yours,

Clifford E. Rose.

RESOLUTION ADOPTED BY THE AMERICAN SOCIETY OF ORTHODONTISTS

It has come to the attention of the American Society of Orthodontists that quite recently a Bill designated as Assembly Bill 1214 has been introduced into the Legislature of the State of California, which provides for the creation of a new profession to be known as the profession of Orthodontia. The Bill further provides that this Profession shall be under the jurisdiction of the State Board of Medical Examiners and subject to their examinations.

Orthodontia is now established and practiced as a specialty of Dentistry and is so recognized by all of the leading universities of this country and by the dental examining boards of all of the states of the Union.

The American Society of Orthodontists has been importuned to record an expression regarding the revolutionary change which would be brought about by the enactment of such a law as that proposed by Assembly Bill 1214 referred to.

BE IT THEREFORE RESOLVED: That the American Society of Orthodontists, in regular Assembly, this fourth day of May, 1927, does hereby record its unanimous and unqualified disapproval of such vicious and indefensible legislation, such legislation in the opinion of its members being detrimental to the best interests and welfare of the public at large.

BE IT FURTHER RESOLVED: That a copy of these Resolutions, together with a copy of the aforementioned Bill be sent to the dental press, to the Secretary of the American Dental Association and to the secretaries of each of the dental societies of all of the states of the Union.

Case Reports

REPORT OF CASE COMPLICATED BY AN IMPACTED MAXILLARY CANINE AND EARLY MUTILATION*

By Dr. L. M. James, Kansas City, Missouri

THE purpose of this report is to offer some evidence in support of the occasional practice of resorting to a compromise form of orthodontic treatment. Special reference is made to those cases complicated by the age and development of the patient and from the mutilation of the permanent denture and impacted teeth. The following case has been selected to illustrate this phase of treatment (Figs. 1 and 2).

The patient reported for examination on October 7, 1922. The age of the patient recorded as eighteen years. The physical examination revealed that the health was normal although the patient was small for his age. A history of mouth-breathing since infancy was given. In 1917 the tonsils and

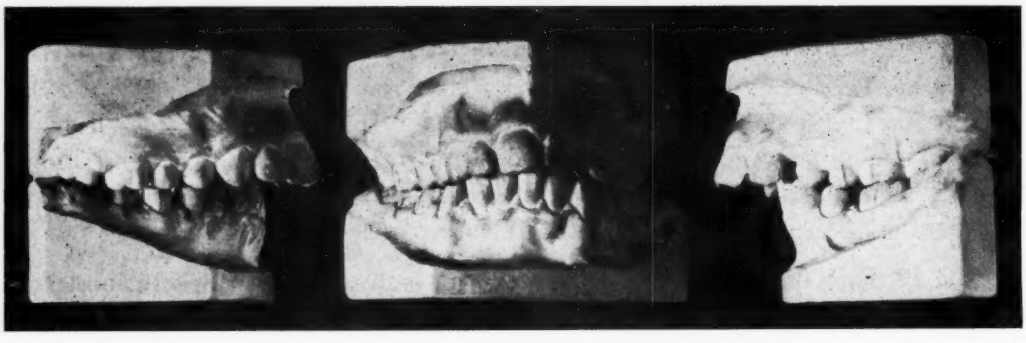


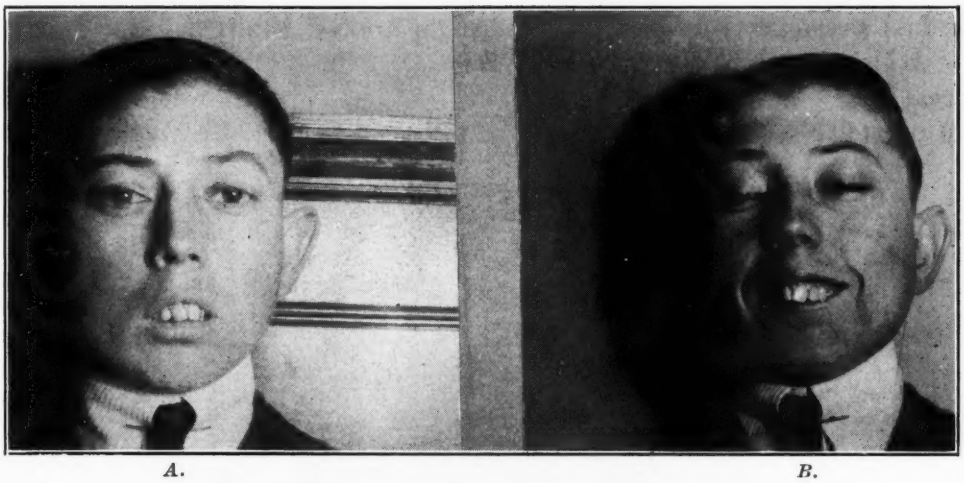
Fig. 1.—Casts of case before treatment.

adenoids were removed. Due to a recent facial injury the patient had a partial trismus of the temporomandibular articulation with considerable swelling in the buccal regions.

The teeth were radiographed and it was found that the left maxillary canine was lying in a lingual and horizontal impacted position. History of caries and premature loss of the deciduous teeth was obtained. The right mandibular first molar was extracted at the age of eight years. The teeth on this side had migrated until the mandibular second molar was in contact with the second premolar. The occlusion of the teeth was a bilateral distoversion with a labioversion of the premaxillary incisors. Because of the general development of the patient and the complication caused by the impacted maxillary cuspid and the early mutilation of the mandibular denture, we deemed it indicated to remove the impacted canine. In order to create better facial harmony we also extracted the right maxillary first premolar, a vital tooth.

We constructed two plain bands on the maxillary first molars with curvilinear sheaths on the buccal surfaces. Spurs were soldered to the mesio-

*Given before the First International Orthodontic Congress, New York City, August 16-20, 1926.



A. *B.*

C. *D.*

Fig. 2.—Patient before treatment.

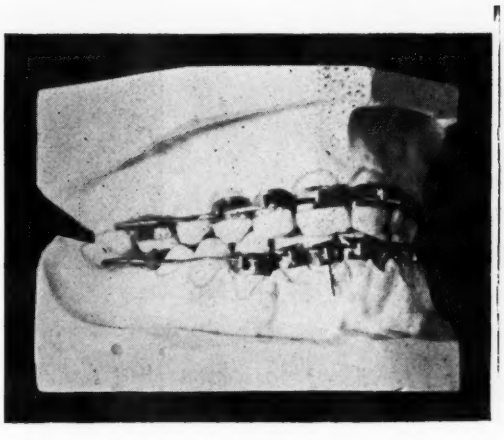


Fig. 3.—Photograph of cast with appliance on.

lingual angle and extended to the mesial surface of the second premolars. The four premaxillary incisors, the maxillary right canine and the maxillary left first premolar were banded with Angle bracket bands.

A plain band was placed on the mandibular left first molar with a round buccal tube. The round tube was used in order to facilitate closing the second premolar space in case we should decide to extract this tooth later. On

Fig. 4.—Occlusal view of cast with appliance.

Fig. 5.—Occlusal view five months later.

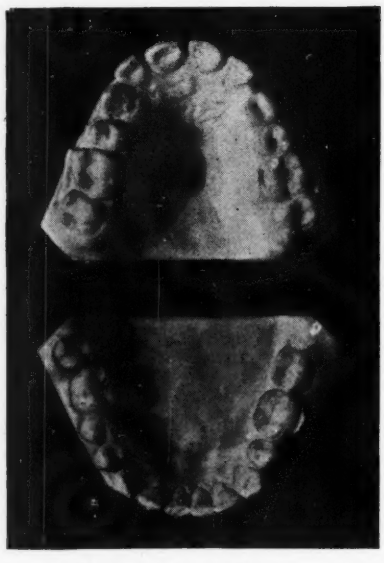


Fig. 6.—Occlusal view thirteen months later.

the mandibular right molar we placed a plain band with a curvilinear tube on the buccal. No lingual spurs were used on the lower molars. The six anterior teeth were banded with Angle bracket bands.

Instead of starting the case with the regular ribbon arches which are 0.022 of an inch by 0.036 of an inch, a plain round wire, 0.020 of an inch in diameter was used on both the maxillary and mandibular teeth until the

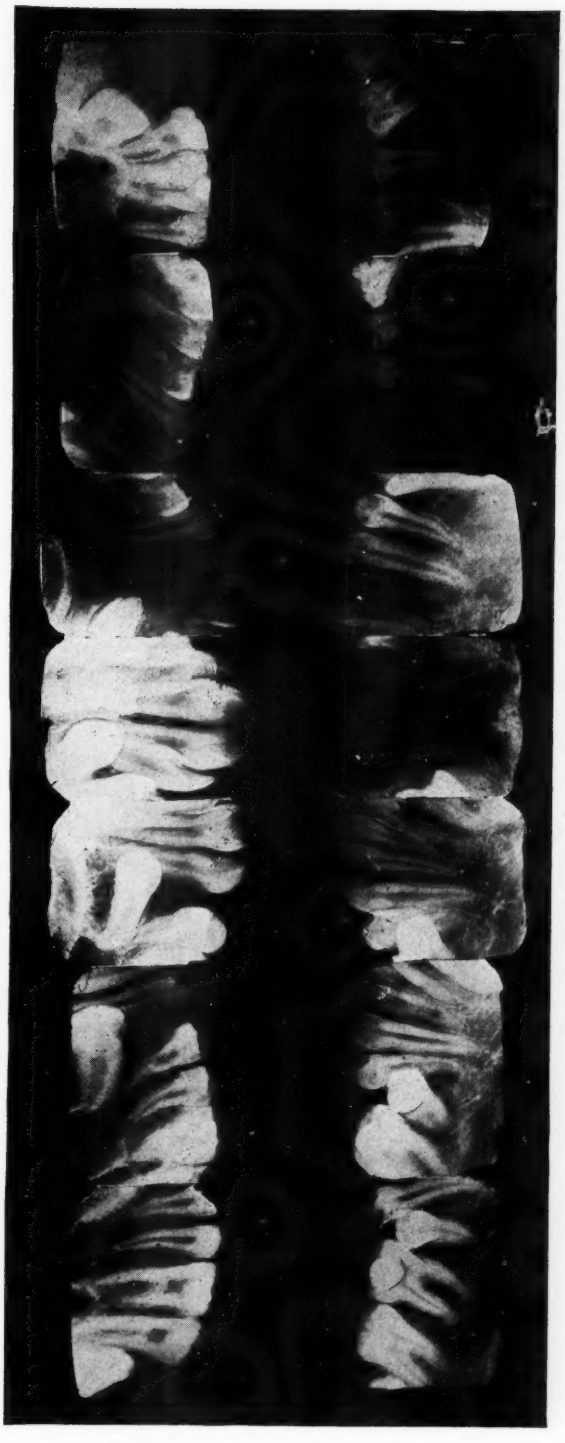


Fig. 7-A.—Radiograms prior to treatment. *B.* Radiograms five months after treatment started. *C.* Radiogram July 7, 1926, after all appliances were removed.

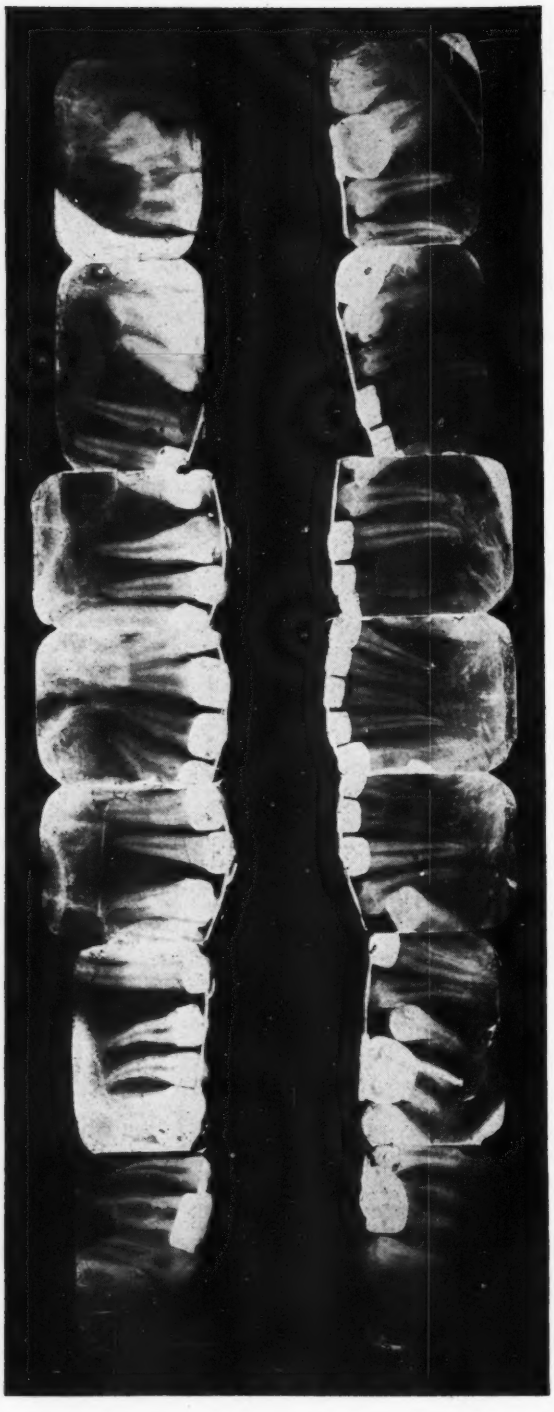


Fig. 7-B.

Fig. 7-C.

teeth were rotated and in such alignment as to require the use of a root moving appliance. (Figs. 3 and 4.) Threaded ribbon arch ends were used with the 0.020 labial arches except on the lower left side where a round wire end was soldered. We prefer the round tube and wire wherever we are considering the closing of a space as in this type of case. Cleats as designed for the Angle ribbon arch were used as auxiliary attachments during the course of treatment. Intermaxillary rubbers were used as an aid in correcting

A. *B.*

C. *D.*

Fig. 8.—Portrait of patient after treatment.

the labioversion of the maxillary anteriors and improving the posterior occlusion. The rubbers were worn for approximately eight months.

Active treatment was started in November, 1922. Fig. 5 illustrates the progress which had been made by March 28, 1923, a period of approximately five months. At this time we extracted the mandibular left second molar for the purpose of equalization of the maxillary and mandibular arches. The space caused by the extraction was closed and Fig. 6 shows progress at the end of the thirteenth month. The mandibular teeth were retained in March, 1924, and all bands were removed from the maxillary teeth in June, 1924,

for a period of rest. The case was kept under observation until October, 1925, at which time the maxillary appliance was replaced for the purpose of correcting the root position of the maxillary right canine. The mandibular retention was removed at this time. The active treatment as instituted for correction of canine in October continued until March, 1926, at which time all appliances were removed. As Fig. 3 shows, there has been a slight loss in the mandibular anterior region, and we are contemplating at this time the construction of a lingual appliance of the Mershon type to correct this occlusion. It is a question, however, in our minds, if it will be possible to improve the relationship of the latter teeth and retain same because of the development of the apical base region. The facial photographs illustrate the asymmetry in the development of the mandible and the poor development in the right anterior region.

Fig. 7 shows radiograms of the case made before treatment was started; again five months after treatment was instituted, and the last radiographic examination made on July 17, 1926, some time after all appliances had been removed. Attention is called to the oblique position of the mandibular left third molar. It is our opinion that this complication was due in part to the mesial movement of the mandibular first molar into the spacing for the mandibular second premolar which was extracted.

As the study casts will indicate, the active period of treatment consisted of about eighteen months. A rest period due to the patient's being out of the city extended over a period of approximately seventeen months. Active treatment was again started on the maxillary teeth for the purpose of correcting the root position of the right maxillary canine. This continued for a period of about five months, making a total of approximately twenty-three months of active treatment. No retaining appliance was used on the maxillary teeth. The mandibular teeth were retained from March, 1924, to October, 1925. (Fig. 8.)

In conclusion I wish to state that I am aware of the fact that the occlusion obtained is not ideal. The result, however, I believe will stand the acid test of time. The patient's appearance has been greatly improved and the efficiency of the masticatory organs has been increased.

RELIEVING IMPACTED PREMOLARS (CASE REPORT)*

By Frank H. Harrison, Waco, Texas

Bob R., age twelve.

Visited two dentists to have maxillary canines removed on account of appearance; both dentists referred him to an orthodontist. Tonsils and adenoids were removed.

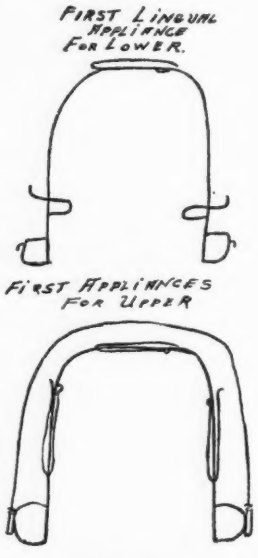


Fig. 1.

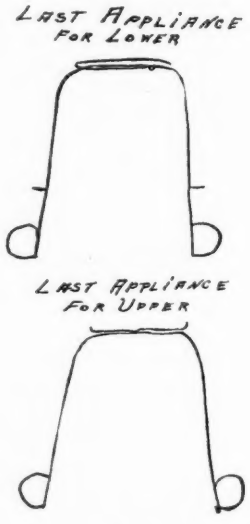


Fig. 2.

Fig. 3.

Fig. 4.

*Given before the First International Orthodontic Congress, New York City, August 16-20, 1926.

Case started October 1, 1923. Appointments every two to four weeks. Appliances removed September, 1925. Fig. 1 appliances first used. Fig. 2 appliances last used.

X-ray examination (Fig. 3) showed both mandibular second premolars impacted. Treatment consisted of maxillary expansion first to allow mandibular expansion and forward movement of all mandibular teeth anterior to second premolars.

Appliances now off ten months and no relapse except slight lapping of lower anteriors.

Fig. 4 photographs of finished case.

Clinics

TREATMENT OF THE DEEP UNDERBITE WITH THE INCLINED PLANE (CLINIC)*

By Dr. Herbert A. Pullen, Buffalo, N. Y.

THE action of the inclined plane in the treatment of the deep underbite in a case of neutroclusion (Fig. 1) tends to change the occlusal plane of the teeth of the mandibular arch so that by a depression of the mandibular incisors in contact with the inclined plane, and a partial vertical growth in the premolar and molar region, the maxillary incisors may be lingually moved so that their lingual surfaces will occlude properly with the edges of the mandibular incisors, and retain them in their corrected pose.

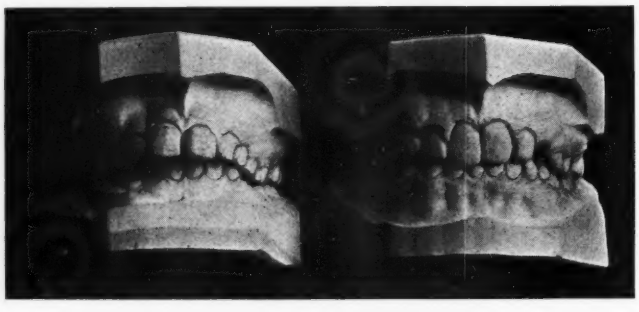


Fig. 1.

Fig. 2.

This effect has been produced with an inclined plane formed on the anterior portion of a roofplate with molar crib attachments for anchorage, and an anterior or labial arch wire extending from canine to canine with loops fashioned over the canines and the extremities imbedded in the plate lingual to the embrasures between the canines and first premolars. This appliance, being removable, is easily cleaned, and for that reason, may prove to be of nearly as much service in some cases as the fixed appliance which is described in this clinic.

This fixed appliance (Fig. 2), however, has other advantages, among which are its fixation, which means a continuity of use and effect; its deli-

*Given before the First International Orthodontic Congress, New York City, August 16-20, 1926.

cacy and refinement which appeal to the esthetic sense; its lack of covering of the roof of the mouth as with the plate, thus interfering less with speech and functions; its loop inclined plane which allows the fluids of the mouth to freely circulate above the plane, and more easily remove food with the aid of the tongue.

The loop inclined plane is not new, it having been introduced by Dr. J. Lowe Young, who illustrated the loop inclined plane on a lingual arch supported by half round rods locked in half round tubes on molar bands posteriorly, and by a spring lock on incisor bands anteriorly.

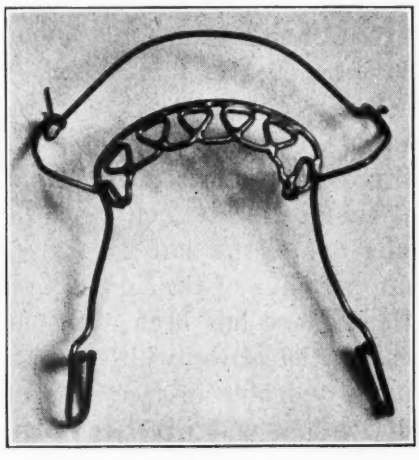


Fig. 3.

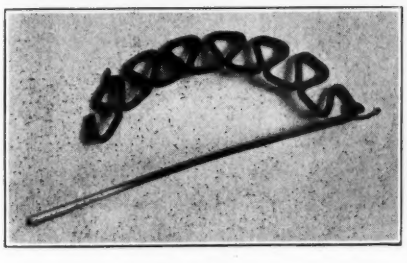


Fig. 4.

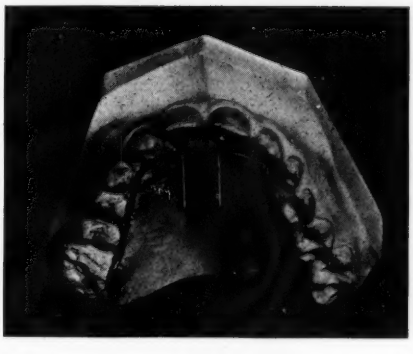


Fig. 5.

The appliance shown in this clinic (Fig. 3) is composed of three units, a lingual arch, an inclined plane of loop construction attached, and a partial labial arch. The lingual arch may be used first to widen the dental arch, and later as a base upon which to form and attach the loop inclined plane. The partial labial arch, attached to the lingual arch, distally to the canines, serves the purpose of reducing the protrusion of the incisors, and, in combination with the anterior edge of the lingual arch, tends to depress the maxillary incisors somewhat.

This appliance may be designated as a labiolingual arch, with lingual loop inclined plane attached.

An ingenious method of uniform and continuous loop construction is shown in Fig. 4, in which it may be observed that the loops are constructed out of a single piece of gold and platinum wire, bent to the curve of the lingual arch, and soldered at contact points, a suggestion of Dr. Clifford G. Glaser.

The width of the inclined plane mesiodistally, and its pitch are determined without the use of the anatomic articulator and the extra time involved in otherwise making and setting up casts in an articulator is saved by using the natural occlusion of the teeth in the mouth as follows: The lingual arch is first adjusted in position on a plaster cast (Fig. 5) and a section of base wire about one-half inch in length soldered to the upper edge of the lingual arch at a hypothetical angle of inclination which is corrected after trying the lingual arch in the mouth at this stage. The length of the plane is marked on the half inch wire as the farthest posterior position the edges of the mandibular incisors can assume. The pitch is made steep enough to open the bite in the incisor region to correct the height of the occlusal plane in the anterior portion of the dental arches.

It is advisable to solder two of the half inch wires lingual to the central or lateral incisors on the upper edge of the lingual arch, and later, to remove them after the loop inclined plane has been adjusted to the pitch of these indicating guides, and constructed of the width marked.

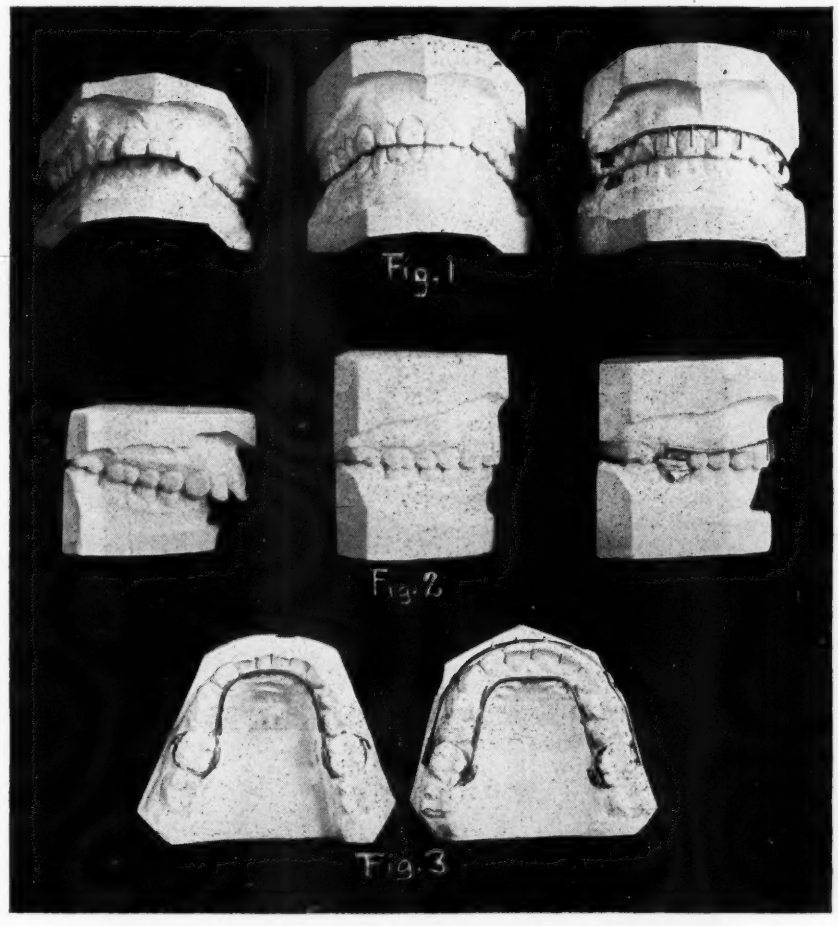
This appliance is equally valuable in cases of distoclusion, the only difference being the construction of a wider inclined plane of a steeper pitch in order to "jump the bite" to the proper mesiodistal relations of occlusion.

SEVERAL OVERBITE CASES TREATED WITH THE LINGUAL AND PLAIN LABIAL ARCHES (CLINIC)*

By Dr. Norborne F. Muir, Roanoke, Va.

ALL the cases shown in this clinic were treated with the lingual and plain labial arches with slight variation to meet the conditions involved.

The types of overbite, as seen by the models varied from the neutroclusion class with retruding anterior teeth to distoclusion cases with protruding anterior teeth.



*Given before the First International Orthodontic Congress, New York City, August 16-20, 1926.

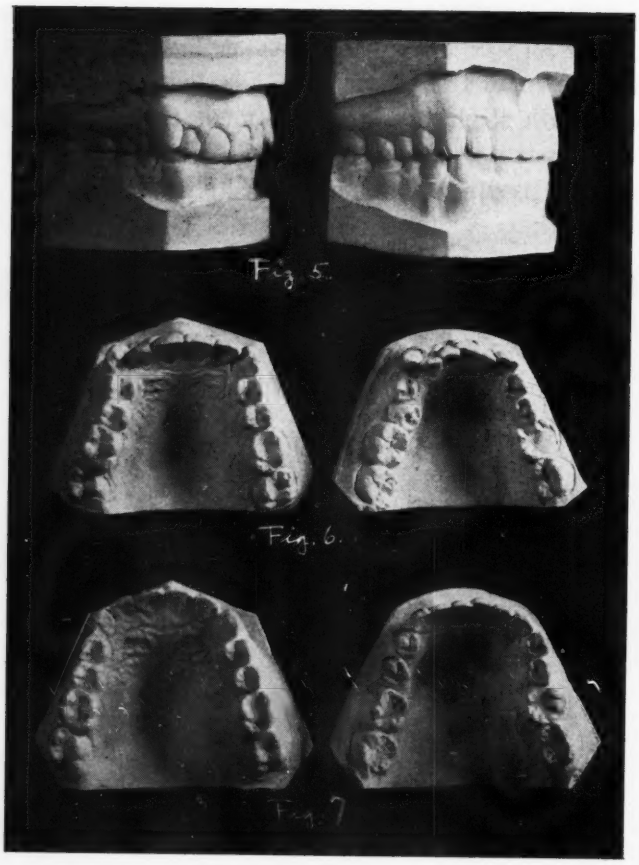


Fig. 5.
Fig. 6.
Fig. 7

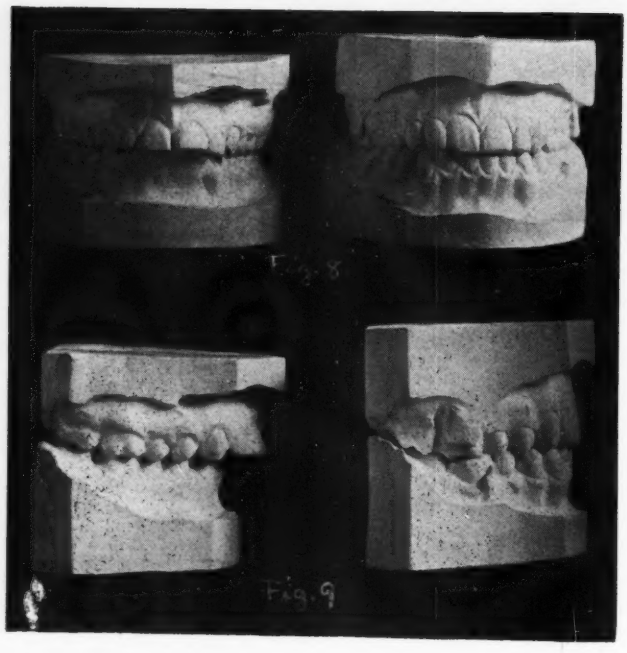
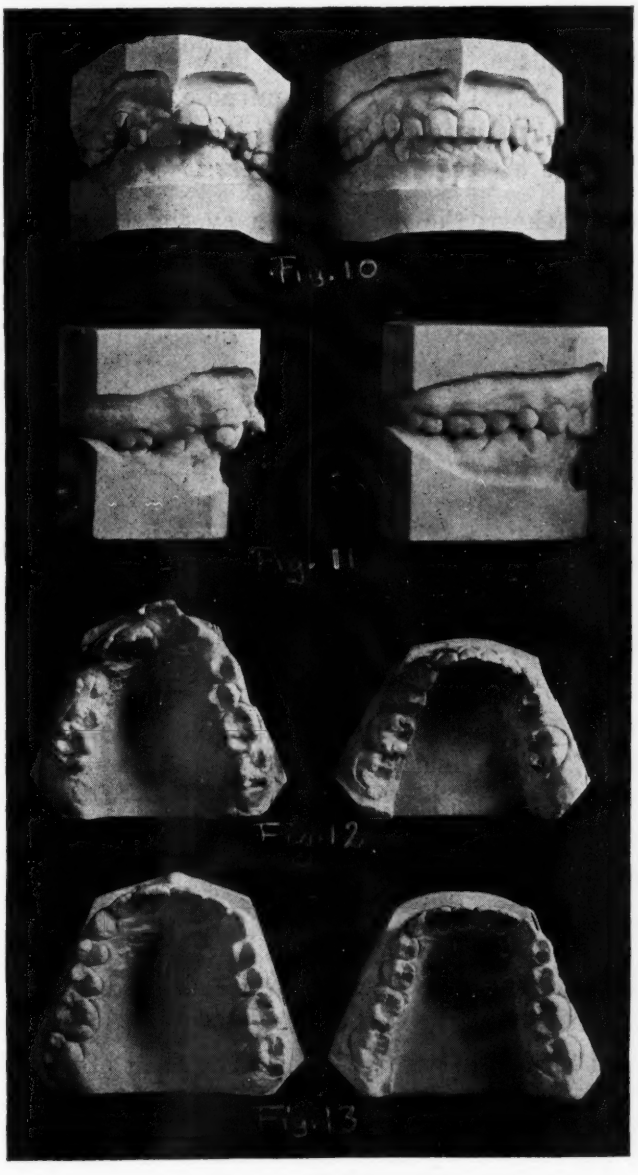


Fig. 8
Fig. 9

Along with the lingual and labial appliances, intermaxillary elastics were used. In the neutroclusion cases the elastics served to stabilize the mandibular molars, while the other teeth were moved forward and in the distoclusion cases the elastics helped bring all the mandibular teeth forward.



Case 1.—Fig. 1 shows three models showing the anterior aspect of an overbite case of a girl aged thirteen. The model on the left shows the protruding maxillary anterior teeth and overbite to the extent that the mandibular anterior teeth touch the palate just posterior to the maxillary anterior teeth. The model in the center shows the completed case and the model on the right shows the labial arch with finger springs touching near the incisal edge of the anterior teeth for the purpose of tipping them lingually.

Fig. 2 shows the lateral view of models described under Fig. 1.

Fig. 3 shows the lingual appliances used in case described under Fig. 1. The lingual arches have recurved finger springs soldered gingivally on the base wire. Time of treatment four years.

CASE 2.—Fig. 4 is an anterolateral view of an overbite case of a boy aged twelve. The model on the left shows the case before treatment with the lingual arch in place. Note the wire loop soldered on the labial arch wire anterior to the buccal tube for the purpose of adjusting the appliance. The model on the right shows the completed case one year after removal of the appliances. Time of treatment three years.

CASE 3.—Fig. 5 shows the model of an overbite case of a boy fourteen years of age. The four maxillary anterior teeth are retruding and the canines are crowded out of line labially. The model on the right shows the completed case.

Fig. 6 shows the lingual aspect of the case described under Fig. 5 before treatment.

Fig. 7 shows the lingual aspect of the completed case shown in Fig. 5. Time of treatment four years.

CASE 4.—Fig. 8 shows the anterior aspect of the case of a boy aged fifteen before and after treatment. This case had marked overbite with protruding maxillary incisors.

Fig. 9 shows the lateral view of case shown under Fig. 8. Time of treatment three and one-half years.

CASE 5.—Fig. 10 shows the anterior view before and after treatment of an overbite case of a girl aged eleven. This was a typical distoclusion case with extreme overbite causing the mandibular anterior teeth to close well into the roof of the mouth. The maxillary right central and lateral incisors were retruding while the left central and lateral incisors were protruding. There was very little space for the eruption of the mandibular second premolars.

Fig. 11 shows the lateral view of case described under Fig. 10 before and after treatment.

Fig. 12 shows the lingual aspect before treatment of case described under Fig. 10.

Fig. 13 shows the lingual aspect after treatment of case described under Fig. 10. Time of treatment three years.

RECORDING ACTUAL PRESSURE EXERTED BY AUXILIARY SPRINGS IN CONJUNCTION WITH LINGUAL ARCH (CLINIC)*

By Dr. H. C. Metz, Pittsburgh, Pa.

ONE of the most perplexing problems in the use of the lingual arch and auxiliary springs is the uncertainty of the application of auxiliary spring pressure.

It is important in the application of pressures that we should have a knowledge of the same for the purpose of aiding us in a material way. Dr. R. E. Irish has devised a precision instrument for the purpose of accurately recording these pressures.

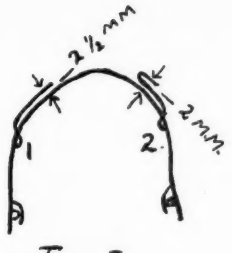


Fig. 3

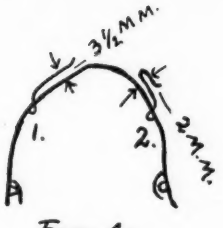


Fig. 4.

My clinic, as presented, is of readings of auxiliary spring pressures taken from the instrument mentioned above, also of appliance readings, and models of the case used for the same, showing tooth movement to date and recorded pressures that caused the same.

The appliance was placed in the mouth of a patient aged ten years for one week in a passive position. One week later adjustments to the auxiliary springs were made as shown in Fig. 3.

Six weeks later other adjustments were made as shown in Fig. 4. Eight weeks later the teeth had jumped the bite as shown in Fig. 5.

Fig. 1 shows models of patient aged ten with both lateral incisors in lingual occlusion.

Fig. 2. Type of appliance used showing position of auxiliary springs.

*Given before the First International Orthodontic Congress, New York City, August 16-20, 1926.

Fig. 3 shows first adjustment of auxiliary springs. Number one stands two and one-half millimeters away from the body wire and requires three ounces pressure to force it back to the body wire. Number two, recurving type stands two millimeters from the body wire and requires nine and three-fourths ounces to force it back to the body wire.

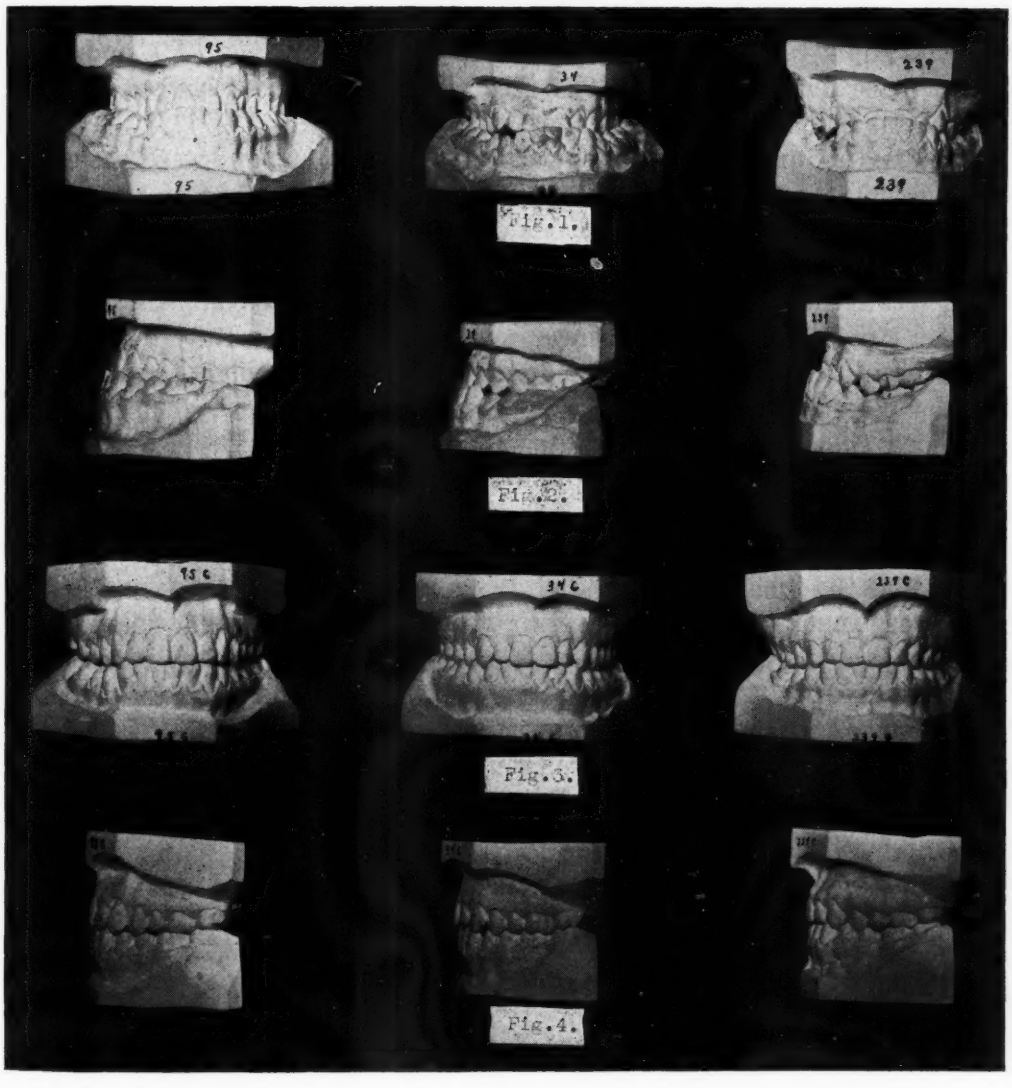
Fig. 4 shows second adjustment of auxiliary springs. Number one is placed three and one-half millimeters from the body wire and it requires four ounces pressure to force it back to the body wire. Number two remains at two millimeters from the body wire and requires ten ounces to move it back to the body wire.

Fig. 5 shows model showing lateral incisors after treatment.

RESULTS OBTAINED IN TREATMENT OF MESIOCLUSION CASES (CLINIC)*

By Dr. Max E. Ernst, St. Paul, Minn.

THE purpose of this clinic is not, primarily, to show finished results in the treatment of mesioclusion cases, but rather to call attention to the inclination of the teeth after the completion of treatment.



The photographs will show the results obtained.

Figs. 1 and 2 show cases before treatment and Figs. 3 and 4 after the treatment has been completed.

*Given before the First International Orthodontic Congress, New York City, August 16-20, 1926.

Case 95 is a girl sixteen years of age at the beginning of treatment. Ribbon arch appliances were placed in January, 1920. A maxillary lingual arch was placed in June of the same year. This was done in order better to obtain expansion as well as to stabilize anchorage. Maxillary removable retaining appliance and a mandibular lingual arch for retention were placed in July, 1922. No intermaxillary force was applied since that time. Models of the finished case, as shown, were made about two years after retaining appliances had been removed.

Case 34 is a girl fourteen years of age at the beginning of treatment. The mother has a case very similar.

Maxillary and mandibular ribbon arch appliances were placed in December, 1917, and retaining appliances were placed in December, 1919. Because of a slight relapse the appliances were replaced in June, 1921, and were kept in place until November, 1924. All appliances were removed at that time and no retaining appliances were placed.

In Cases 34 and 95 unerupted mandibular third molars were removed.

Case 239 is a girl thirteen years of age at the beginning of treatment. The mother has a similar case. In this case the mandibular first molars were so badly broken down that extraction was necessary. The spaces were closed during treatment. Maxillary and mandibular ribbon arch appliances were placed in April, 1922. All appliances were removed in November, 1924, and a band with a buccal spur on mandibular left first premolar was the only retention placed.

Models showing completed treatment in Cases 34 and 239 were made in June, 1926, a little more than one and one-half years after removing all retaining appliances (except the band for rotation in Case 239).

By comparing side views of models before and after treatment, it will be seen that the inclination of the anterior teeth is quite satisfactory. This type of case generally presents teeth that are badly inclined and, unless some method is used to prevent it, the treatment may cause still greater inclination.

In the treatment of these cases the ribbon arch appliance was used because it has proved quite effective in the operator's hands for most root movement. No doubt, other men are obtaining results, even more satisfactory, with other types of so-called bodily movement appliances.

DEPARTMENT OF
ORAL SURGERY, ORAL PATHOLOGY AND SURGICAL ORTHODONTIA

Under Editorial Supervision of

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FRACTURE OF THE CORONOID PROCESS

By Sterling Mead, D.D.S., Washington, D. C.

MR. M., aged 50, who resides in the country, was robbed and beaten by two highwaymen, and sustained a fracture of the left coronoid process. He presented himself for treatment one week following the injury, and there was a great deal of edema and discoloration of the tissues of the cheek and under

Fig. 1.

the eye. He experienced much pain in opening the mouth, but it could be pulled open with pressure without deviation of the chin toward either side. Pressure directly over the coronoid region caused extreme pain. An extraoral radiogram showed complete fracture of the coronoid process, and showed that

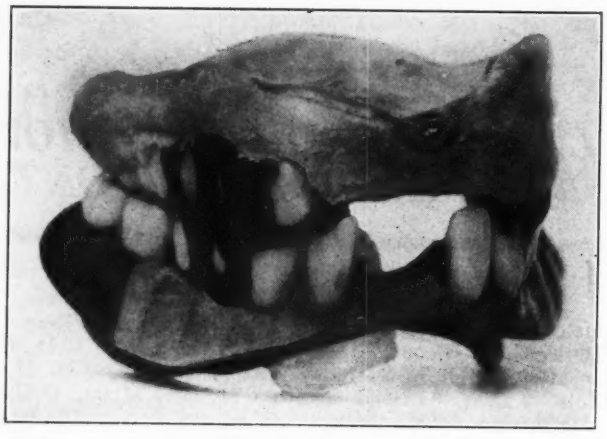

Fig. 2.

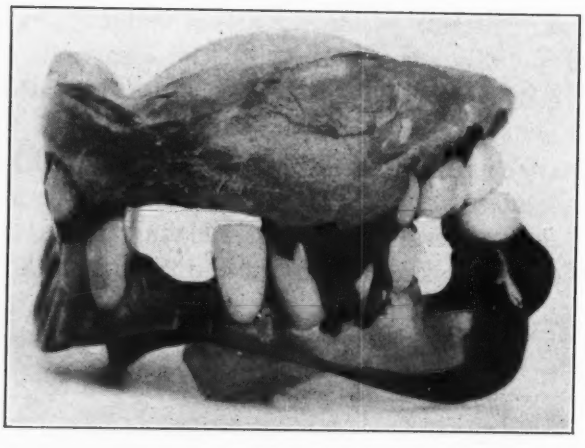

Fig. 3.

Fig. 4.

the process was being pulled upward by the temporal muscle, leaving a space of about one quarter of an inch between the displaced fragment and the body of the ramus. Fig. 1.

At the time of the accident he was wearing an upper and a lower plate, as he was completely edentulous. When he presented for treatment he had the lower plate, which fitted very well. The upper plate, however, had been lost, but he had another old plate at home which did not articulate with the lower set he was wearing. The old upper plate was articulated with the lower set and fixed with bee's wax and the two plates vulcanized together, an opening being cut in the front and another on the side so that he could get his food more easily. The ridges of the upper plate were filed down and a layer of modeling compound spread over it and the denture put into his mouth while the modeling compound was soft. This gave an accurate impression of the upper mouth. This was smoothed off, and the denture returned to the mouth and left. The case was not vulcanized, as that would have taken additional time, and the modeling compound was entirely satisfactory. Figs. 2 and 3.

The patient's head was covered with gauze and a plaster headgear made, with a wire loop on each side fastened into the plaster. This was allowed to harden. A long strip of heavy rubber dam was cut and folded. After placing under his chin, each end was run through the wire loop and the two ends brought down again under the side of the mouth and tied. This helped to keep a gentle pressure on the chin and kept the mouth closed in normal position.

The swelling soon subsided and the discoloration left. Fig. 4 shows the headgear and the rubber dam in place. After six weeks the dentures were removed, as well as the headgear. The fractured parts had united, and he was able to use his mouth freely. He then obtained a new set of upper and lower teeth.

ABSTRACT OF CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Tooth and Gum Affections as Causes of General Diseases. G. Exner (Berlin). Correspondenz-Blatt für Zahnaerzte, 1927, li, No. 2.

The author before narrating a series of personal cases adduces all of the accumulated evidence of the reality and frequency of oral focal infection, bearing in mind the indifference and skepticism of European dentists on this subject. He also appends a voluminous bibliography, limited almost wholly to American authors. The first of his patients was admitted to a hospital with evidences of a serious constitutional disease yet one in which diagnosis was impossible beyond a hemolytic anemia of unknown origin. There was atrophy of the gums in certain areas with several pus pockets. Cultures from extracted teeth showed presence of a streptococcus and were used as a vaccine in addition to bood transfusions. Even after the mouth had been fully sterilized by multiple extractions and treatment of alveoli there was no spontaneous improvement. Finally a blood transfusion, made after injection into the blood donor of the dead streptococci, appeared to produce a miraculous cure. The second case was one of rheumatic arthritis, the third was one of urticaria, the fourth of furunculosis, the fifth and sixth of rheumatic arthritis. The experience in the entire series was of the same sort, for while sterilization of the mouth was an important and inevitable procedure in the cure the dramatic factor in this direction was the application of the autovaccine. Only in the first patient was the vaccination effected by means of a blood donor as a step in connection with transfusion.

Nonspecific Stimulating Treatment in Dentistry. Weissenfelds (Heidelberg). Correspondenzblatt für Zahnaerzte, 1927, li, No. 3.

The author refers to the injection of proteins like milk and blood serum with the aim of stimulating the cell protoplasm and exciting all the functions of cell life including especially that of defending the organism from infective germs. This has in general been little used in dental infection and in fact as far as the treatment of joint diseases is concerned may be thought of as a competitor of extraction and sterilization of the teeth. The author plunges into a long account of this form of treatment and of the substances most in use for injection into the system, for the substances in use are hardly ever given by the

mouth. It is possible that some of the remedies now in use in dentistry act in accordance with the principle of stimulation. The author first mentions the Pregl solution of iodine as possibly belonging here, and he has seen many favorable results from it, although unfortunately not all who have employed it have had the same experience. This solution is only a 0.04 per cent concentration of iodine in some isotonic solution which is injected into the gums, about the apices, etc. Others have used Rivanol on this theory, for chronic granulating periodontitis especially. No other substances are mentioned by the author and the inference is that these two exhaust the list of drugs thus far recommended. In general medicine and surgery the substances most used have been boiled cows' milk and preparations from the same, blood serum and whole blood, colloidal matter of many kinds, lipoids, certain crystalline salts, etc. As far as known these do not seem to have been tested seriously in dental infections.

Oral Signs of General Disease in Children. Editorial in The Dental Surgeon, April 19, 1927, xxiv, whole number 1172.

This was the subject of a symposium of the Royal Society of Medicine held on April 6 and reported in the current British Medical Journal. The occasion was a joint session of the Pediatric and Odontological sections. The editor is disappointed in some of the results, bearing in mind the title of the symposium, for little came to light. Nothing of importance was elicited on enamel defects which are now attributed to the same nutritive disturbance or shortcomings as osseous defects. The generalization that Hutchinson's teeth so-called never are present in deciduous dentition while it mostly holds good can sometimes show exceptions as in an illustrated case presented by E. Wallis. The precise relationship of syphilis to these teeth is problematic but does not seem disputed either by the society or the editor, despite the fact that recent pathologists have denied that such notched and dome-shaped teeth are specific for syphilis. Dr. Robert Hutchinson, the well-known dietetic authority, shocked the editor of the *Dental Surgeon* by his statement that sugar is a food of such value to children that a little caries is none too large a price to pay. If this statement is not modified to some extent untold harm may result. The sugar that reaches the stomach may be good for the child but the fraction which remains adherent to the teeth is pernicious when we consider the remote consequences of caries. Another member is taken to task for speaking lightly of marginal redness of the gum for this simple condition can lead up to pyorrhea if unchecked. We get the impression that the oral manifestations of general disease are relatively slight and unimportant in the child.

Grippe and Tooth Troubles. S. Lehmann (Frankfurt am Main) Correspondenz-Blatt für Zahnaerzte, 1927, li, No. 4.

During and also before the pandemic of influenza the author noted a cumulation of troubles of the maxillary sinuses, during and after influenzal attacks, and in addition miscellaneous dental troubles manifested as toothache. In such cases he learned the wisdom of sending patients to the

physicians before undertaking any dental treatment. Dead teeth, teeth with crowns and bridge anchors hitherto quiet suddenly began to give trouble but it was found that mostly the symptoms subsided with complete recovery from the influenza. In several cases, however, extraction was required. One patient had a short attack followed by a slight relapse. Teeth which supported a bridge began to ache but the first attack subsided (this was on the left side). A few days later the toothache reappeared on the right side and a molar with a gold crown required extraction. The fever of influenza was still present at the time. There was more or less toothache until after convalescence but no further radical treatment was required. In a second patient the right maxillary lateral incisor which was the seat of a loose Richmond crown began to ache during an attack of grippe and extraction was refused. An abscess soon developed with swelling of half the face and severe neuralgic pain. After local applications of antiphlogistin had brought down the swelling the root was extracted. The cure was completed with the quartz lamp. The author admits that there is nothing new or highly important in this communication but there is very little literature on the subject and it can do no harm to call attention to it.

Dental Patients with Fever. H. Moral (Rostock). Zahnaerztliche Rundschau, February 27, 1927, xxxvi, 8.

It is a rarity for a dental patient to have fever, that is, in ordinary practice. The use of the clinical thermometer is not common although the author evidently makes routine use of it in certain classes of cases at least. Whoever forms this habit will be astonished to note how often a rise of temperature is present. This is often due to the peculiar nature of the patient as seen in ulcerous stomatitis which usually runs its course without any fever yet may mount up as high as 104° in some patients. A high temperature does not necessarily mean a severe infection nor a low one a mild infection. It is an easy matter if fever is present to examine the throat which is probably the most common origin of the temperature rise—either a tonsillitis or angina of the entire throat. Severe acute infection proceeding from the mouth is very rare and includes true acute dental sepsis, phlegmon of the floor of the mouth, long known as Ludwig's angina and venous thrombosis extending into the cerebral sinuses. Very instructive are the curves of temperature published with the article. Thus after a wisdom tooth extraction the temperature rose suddenly on the third day, an abscess was found and incised on the fifth day after which it fell to normal. Other postoperative fever curves are also figured. If infection arises in or extends into the pterygomaxillary space, high temperature may follow. In periodontitis about a first mandibular molar the author records a sharp rise of temperature. The author's unusual interest in this subject may be due in part to the fact that clinical thermometry was first employed in the University of Rostock.

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EDITORIALS

Should Orthodontia Be a Separate Profession?

AT THE recent meeting of the American Society of Orthodontists, Assembly Bill 1214—introduced by the Legislature of the State of California—was called to the attention of the members.

The president appointed a committee to make recommendations in regard to this bill. The resolution adopted by the American Society of Orthodontists as prepared by the committee is published in this issue of the Journal.

We have not the exact bill before us, but judging from the wording of the resolution, Assembly Bill 1214 was intended to take the practice of orthodontia out of the dental profession, place it under the control of the medical profession, and establish the profession of orthodontia.

We doubt the wisdom of this action because, as the committee stated in the resolution, orthodontia is now established and practiced as a specialty of dentistry. While orthodontia has long been practiced as a specialty, it must be

remembered that it is a part of dentistry, and as such can be practiced by any man who is licensed to practice dentistry.

A medical student learns various branches of medicine and when he passes the state board examination, he is qualified to practice all of these branches. However, he may elect to specialize in one particular subject. In fact, many branches of medicine are recognized as specialties, but in spite of this, the fact does not disqualify any licensed practitioner from practicing any one of these specialties. In other words, in all the professions—medicine, dentistry, law—specialists are not created by acts of legislature. When a man is granted a license to practice any of the learned professions, it is recognized that he may practice any or all branches of that profession.

The committee framing the resolution adopted by the American Society of Orthodontists stated that orthodontia is recognized as a specialty by dental examining boards of all the states in the Union. In this fact, the committee is in error because dental examining boards do not recognize orthodontia or any other branch of dentistry as a specialty. Likewise, medical boards do not recognize any branch of medicine as a specialty. If a medical man who has a reputation as a specialist, desires to become licensed in another state—unless a reciprocity agreement exists between the two states—he is compelled to take a medical examination in all branches of medicine, regardless of the fact that he may desire to practice as a specialist. This is also true in dentistry. If a man who has been engaged in the practice of orthodontia or any other specialty of dentistry seeks a new location, it is necessary for him to take an examination in all branches of dentistry.

Therefore, orthodontia is not recognized as a specialty by dental examining boards as stated by the committee in framing the resolution. Orthodontia is a part of dentistry and is considered as a specialty only by the public, because certain men have been able to render better service than those who have not devoted as much time in perfecting their skill.

We have often thought that it might be advisable to have special examinations for medical and dental men who desire to practice a specialty. However, before such a thing can occur, it will be necessary to change the legislature of the states, as they attempted to do in California. It is our belief that such an attempt would meet with the disapproval of the profession; the same as expressed in the resolution adopted by the American Society of Orthodontists.

We are also informed that both the medical and dental professions were against Assembly Bill 1214 in California which resulted in its defeat.

It may be wise to have certain examinations for both medical and dental men who intend to specialize; but such a plan will be far in the future. For the present at least, orthodontia as well as other specialties in medicine and dentistry will belong to the profession. The public will be the final judge as to the fitness and qualifications of the man to practice that branch of specialty. If he can satisfy the public, he will succeed; if he cannot, he will fail.

Therefore, the only law governing this question, will be the law of the survival of the fittest.

FORUM

Report of Round Table Discussion*

Table No. 4.—Topic: From clinical experience and observation viewed from an entirely practical and unbiased standpoint, is there any particular outstanding factor which is responsible for the prevalence of malocclusion as observed in everyday practice; if so, what is the practical and popular reaction to this question?

Chairman—D. Willard Flint, Pittsburgh, Pa.
Vice-Chairman—Walter Ellis, Buffalo, N. Y.

The subject, which implies a question to be answered, was found so fundamental as to involve the etiology of malocclusions as a whole, and during the discussion some of those present, called attention emphatically to various etiologic factors, which in their opinion were responsible for more malocclusions than any other.

The discussion showed that there was considerable difference of opinion, as to what were the most important etiologic factors, and probably if an accurate stenographic report could have been made, it might have added something to the knowledge of some of the already much discussed etiologic factors in malocclusion.

There were others, who felt that whether it was the intention of the question or not, it nevertheless, was really much more fundamental in its character than the above comments would indicate, and must be treated from that basis.

The real theme of the paper then, as it appeared to two or three of the members, involved the difference between environment and possibly heredity (to some extent) among those races in which malocclusions exist and those in which it does not exist. This theme having been proposed much of the discussion was devoted to it.

One or two of the members called attention to the fact, that if we are to discover the great outstanding facts responsible for malocclusion, we must first note where malocclusion exists and where it does not exist. It has been pretty well demonstrated that malocclusion was, and always has been, negligible among primitive races. These races lead a natural life; they conform in their life habits, and for the most part in their diet to the evolved requirements of countless generations. On the other hand, among all civilized races, or those who have adopted an artificial environment and diet and particularly certain modes of preparing the food for ingestion, malocclusion is the rule rather

*Report of Round Table Discussions held at the Twenty-sixth Annual Meeting of the American Society of Orthodontists, May, 1927.

than the exception. It would seem then that the great outstanding factor responsible for malocclusions as we see them in everyday practice or as we see them walking about the streets, is the civilized environment in which we live.

It was the general conviction, that many generations of civilized living might have instilled into the race, tendencies which might and probably often do aid in a hereditary way in producing malocclusions, thus further complicating the already complex subject of etiology, and these obscure factors, whether hereditary or not, are responsible of course for many otherwise unaccountable failures in treatment and cannot be intelligently combated, because not always known and understood. They are often suspected only because the case fails to react to the usual methods of treatment. The more obvious factors, such as are discussed in every textbook, if removed, of course cease to combat our efforts, but even though recognized it is not infrequently impossible to entirely eradicate them.

It was, however, the general conviction that the cure for the fundamental cause of malocclusions, involving as it does a return to primitive life, was impracticable (although a few individuals accomplish it even in a civilized environment, so far as diet and function are concerned) and, therefore, the need for a more thorough study of the general etiologic complications of malocclusions as they appear to us in daily practice, is probably the most important problem confronting the orthodontic profession.

ORTHODONTIC NEWS AND NOTES

Resolution Regarding Death of Dr. N. S. Hoff

Chicago, May 4, 1927.

It is fitting at this time to pause in the midst of a busy session to do honor to our friend, Dr. Nelville S. Hoff, who has recently gone to the Great Beyond. Dr. Hoff was one of our early, faithful and devoted members.

In his passing we have lost an esteemed confrère, one who was both teacher and friend, and a man whose council was sought by many.

Be it therefore resolved, that this Society record his passing, with sincere regret, and spread upon its minutes this token of our love and esteem.

American Society of Orthodontists.
Committee, Herbert A. Pullen and Milton T. Watson.

American Society of Orthodontists

The next annual meeting of the American Society of Orthodontists will be held April 30, May 1, 2 and 3, 1928, at the Hotel Statler, Buffalo, New York. Members in good standing in the American Dental Association are cordially invited to attend.

Walter H. Ellis, President; Charles R. Baker, Sec'y-Treas. 708 Church Street, Evanston, Ill.

Federation of American Women Dentists

The sixth annual meeting of the Federation of American Women Dentists will be held in Detroit, Mich., October 24, 1927. Women members of the American Dental Association welcome.

Grace Rogers Spalding, President; 423 Maple Avenue, West Birmingham, Mich. Mary B. Meade, Sec'y; Carmi, Illinois.

The First District Dental Society

The First District Dental Society announces its third *Better Dentistry Meeting* to be held at the Hotel Pennsylvania, New York City, December 5, 6 and 7, 1927.

In conjunction with this meeting a dinner will be tendered Dr. William Dwight Tracy in recognition of his contribution and unselfish devotion to the profession.

Detailed information will be published at a later date.

University of Toronto Faculty of Dentistry Annual Course for Dental Practitioners to Be Held September 12 to 17, 1927

The Annual Course for Dental Practitioners is to be held this year for one week, commencing Monday, September 12. This is the week immediately following the Canadian National Exhibition, which will be held from August 27 to September 10.

For further information apply to Wallace Seccombe, Dean, University of Toronto.

Notes of Interest

Dr. George A. Barker, practice limited to orthodontia, announces the removal of his offices to 509-511 Medical-Dental Building, Seattle, Washington.

Dr. E. B. Arnold and Dr. J. H. Weaver announce the removal of their offices from 708 Keystone Building to 613 Medical Arts Building, Houston, Texas. Practice limited to orthodontia.

Dr. Guy M. Gillespie of Abilene, Texas, has announced that he will give two days of each week to the exclusive practice of orthodontia in San Angelo, Texas.

Dr. Williams C. Keller announces the removal of his office to Suite 1701, 40 East 49th Street, New York City, New York. Practice limited to orthodontia.

Dr. Paul G. Spencer announces the removal of his office from 1407-9 Amicable Bldg., to 1813 Austin Avenue, Waco, Texas. Practice limited to orthodontia.

Dr. A. N. Thompson announces the removal of his office to 217 Wauwatosa Avenue, Wauwatosa, Wisc.